964321

FRUIT,
FLOWER, AND KITCHEN
GARDEN.

THE

FRUIT, FLOWER, AND KITCHEN GARDEN.

BY THE LATE

PATRICK NEILL, LL.D., F.R.S.E.,

SECRETARY TO THE CALEDONIAN HORTICULTURAL SOCIETY.

FIFTH EDITION,

REVISED AND IMPROVED, WITH ADDITIONS.

EDINBURGH:
ADAM AND CHARLES BLACK, NORTH BRIDGE,
BOOKSELLERS TO THE QUEEN.

MDCCCLIV.

NEILL AND COMPANY, PRINTERS. EDINBURGH.

PREFACE.

This little work, originally prepared for the Encyclopædia Britannica, has passed through four large Editions, and is now generally acknowledged as the most complete and concise work on Practical Gardening hitherto published.

It was the object of the author, the late Dr Neill, to comprise within its pages all that was at the time known to Horticulturists of the various economical plants, indigenous or exotic, cultivated in this kingdom, and the most approved means and appliances by which they are rendered subservient to the wants of man.

The office which the writer held for more than forty years, of Secretary to the Caledonian Horticultural Society, naturally afforded him facilities for acquiring information as to the raising of new fruits, and the introduction of improved modes of culture, particularly in Scotland; and of these facilities he availed himself to the fullest extent, both in the preparation of the original volume, and in the successive editions which have been issued.

The whole subject of Horticulture or Practical Gardening is here treated in a condensed form,—in a popular style, yet, with some degree of scientific accuracy, although no more of the philosophy of the subject has been introduced than seemed requisite to a clear understanding of the practice.[1]

A Fifth Edition being now called for, the death of the author rendered it necessary that the revision of the work, to adapt it to the present state of the science, should be intrusted to other hands. In undertaking it, the Editor has, in compliance with the wishes of the Publishers, not interfered, in any material degree, with the original text, except in that division which relates to the Kitchen Garden, and the plants cultivated therein. This department has been entirely remodelled,—a portion of it rewritten, and new matter added, in which all the improved varieties of the cultivated vegetables are duly noted.

---

[1] Preface to the First Edition.

That part which treats of the culture of Fruits, has been carefully revised, as well as the division devoted to the Flower Garden and Botanical Structures. The other portions have also been carefully considered, and such additions and alterations made, as were deemed useful or necessary, in order to place the information contained in the work on a level with the advanced state of Horticulture, and the improved practice of the present day.

EDW. RAVENSCROFT.

MUSEUM OF THE HIGHLAND AND AGRICULTURAL
SOCIETY OF SCOTLAND, *March* 1, 1854.

CONTENTS.

PAGE

INTRODUCTION, ... 1

FRUIT and KITCHEN GARDEN in general.

Situation, shelter, water, approach, form, exterior, fence, walls and wall-borders, espalier-rails, soil, manures; internal management; Orchards, . . 7

FRUIT GARDEN.

Propagation of Fruit-trees by seed, by cuttings, by layers, by grafting, and by budding, ... 25

Planting and training of Fruit-trees, . 39

Protection of Blossom and Fruit, . . 52

Culture of different kinds of Hardy Fruits.

Grape-vine, ... 53

Fig, ... 59

Peach and Nectarine, , . . 63

Almond, ... 76

Apricot, ... 76

Plum, ... 79

Cherry, ... 83

Pears, early and late, . . . 87

Apples, dessert and culinary, . . 100

PAGE

FRUIT GARDEN—*Continued.*

Quince, ... 108
Medlar, ... 109
Service-tree, ... 109
Mulberry, ... 110
Hazel-nut, ... 111
Walnut, ... 112
Chestnut, ... 113

Small Fruits.

Red, White and Black Currants, . . 113
Gooseberry, ... 115
Raspberry, ... 117
Strawberry, ... 118
Cranberry, &c., ... 124

FORCING GARDEN.

Different modes of generating heat, . 126
Hot air or smoke flues, . . . 127
Heating by steam, . . . 130
hot water, . . . 135
Admission of Air and Light, . . 141
Form of Roofs, ... 141
Vinery, ... 154
Peach-house, ... 162
Cherry-house, ... 167
Fig-house, ... 168
Orangery, ... 168
Pinery: Nursing-Pit, Succession-Pit, and Fruiting-house, ... 172
Culture of Pine-apples, . . . 180
Melonry: various forms of Pits, . . 194
Cucumbers, Gourds, and Mushrooms, . 202

PAGE

KITCHEN GARDEN.

Cabbage Tribe: Hearting Cabbage; Open Cabbage or Cale; Borecole, Greens, or Scotch Kale; Savoy; Brussels Sprouts; Turnip-rooted Cabbage or Kohl Rabi; Cauliflower; Broccoli, . . 210
Leguminous Plants: The Pea, Bean, Kidney Bean, ... 218
Esculent Roots: Potato, Jerusalem Artichoke, Turnip, Carrot, Parsnip, Beet, Skirret, Scorzonera, Salsify, Radish, Oxalis, Tuberous-rooted Indian Cress, 223
Alliaceous Plants: Onion, Leek, Shallot, Garlic, Rocambole, Chive, . . 234
Spinaceous Plants: Spinach, White Beet, Tetragonia, Quinoa, &c., . . 238
Asparaginous Plants: Asparagus, Sea-kale, Artichoke, Cardoon, Rampion, Rhubarb, 241
Plants used in Salads, &c.: Lettuce, Endive, Chicory, Parsley, Celery, Celeriac, Mustard and Cress, Sweet Herbs, and Miscellaneous Plants used in Cookery, 251

FLOWER GARDEN.

General Observations on the design, situation, form, fences, flower-beds, borders, rock-work, aquatic plants, . . 261
Soil, Walks, Edgings, &c. . . 270
Ornamental Shrubs, . . . 274
Rosary, ... 279
Showy Herbaceous Plants, . . 281

PAGE

FLOWER GARDEN—*Continued.*

Florists' Flowers: Hyacinth, Tulip, Ranunculus, Anemone, Narcissus, Iris, Lily, Gladiolus, Dahlia, Auricula, Polyanthus, Carnation, Pink, Violet, Lobelia, Chrysanthemum, . . . 294

Botanical Structures: Greenhouse, Conservatory, and Stove, with the Ornamental Plants suited to each, . . 319

Tropical Orchidaceæ, . . . 329

KALENDAR OF GARDENING OPERATIONS, . . 335

INDEX, ... 361

INTRODUCTION.

HORTICULTURE is that branch of rural economy which consists in the formation and culture of Gardens. Its results are culinary vegetables, fruits, and flowers. On one side it is allied to Agriculture, from which, however, it is distinguished by the nature of its products, and by the smaller extent and greater complexity of its operations; on the other side, in its processes of embellishment, it approaches the department of the Landscape Gardener and the Forester, from which, however, it also retires in the comparative minuteness of its details.

Like other arts, Horticulture borrows its principles from the general sciences. To Botany it is beholden for the facts and theories of vegetable physiology; to Chemistry, for assistance in reference to soils, manures, and artificial heat; and to Meteorology, for a knowledge of many circumstances which very materially affect the labours of the gardener. With these sciences, the philosophical horticulturist will not fail to make himself familiar; but it is very desirable that information on these subjects should be extensively diffused among *practical* men; as it is only from this quarter that much improvement, in our present state of knowledge, can be expected. Truth, however, obliges us to admit, that gardening has been most successfully practised when treated as an empirical art. Few of those who are minutely conversant with its numerous manipulations have undergone such an intellectual training as to enable them to wield general principles with effect. Many who are not inexpert or unsuccessful while they follow the routine practice (a practice, be it remembered, founded on long experience and close observation), egregiously fail when, with imperfect information, or ill-advised ingenuity, they endeavour to strike out new paths for themselves. The object of the art, too, limits the application of the deductions of science. Its whole business consists in the imitation of nature, whose processes may indeed be, in some measure, originated, as when a seed is inserted in the ground; or modified, as in the artificial training of fruit-trees; but which may not be entirely controlled, much less counteracted. The principle of vegetable life will not endure interference beyond a certain point; and our theoretical views should be so directed as to interfere with it as little as possible. Observation and experiment are the grand means by which the art has arrived at its present state of advancement: at the same time, it is obvious that an enlarged acquaintance with science will aid us in imitating the processes of nature, will guide the hand of experiment, suggest contrivances, and enable us to guard against error; and, above all, will tend to dispel those prejudices which practitioners in the empirical arts are so prone to cherish.

Gardening, Mr Walpole observes, was probably one of the first arts which succeeded to that of building houses, and naturally attended property and individual possession. Culinary, and afterwards medicinal herbs, were objects in request by every head of a family; and it became convenient to have them within reach, without searching for them in woods, in meadows, or on mountains, as they might be wanted. Separate inclosures for rearing herbs were soon found expedient. Fruits were in the same predicament; and those most in use, or the cultivation of which required particular attention, must early have entered into and extended the domestic inclosure. Such may be deemed the leading heads of a conjectural history of the art; and, indeed, if we would ascend into remote antiquity, we can have recourse only to conjecture; for although, in the Sacred Writings, and in the earliest profane authors, allusions to gardens occur, little is told us either of their productions or their culture. At the close of the Roman commonwealth, the catalogue of fruits had become considerable, the principles of grafting and pruning were understood and practised, and shortly afterwards, even artificial heat seems to have been partially employed. With the decline of the empire, horticulture seems also to have declined, or to have become stationary; but, at the revival of learning, it arose from the slumber of the dark ages, encumbered, it is true, by the dreams of the alchymist, the restrictions of unlucky days, and the imaginary effects of lunar influence. From these fetters it was ere long emancipated by the diffusion of knowledge, and it has hitherto kept pace with the general improvement of society. Modified by climate and other circumstances in different countries, its advancement has been various; but nowhere has it made greater progress than amongst ourselves. Introduced into England at an early period, gardening became conspicuous in the reign of Henry VIII. and his immediate successors, and met with considerable attention during the reigns of the Stuarts. In the first half of the eighteenth century, Miller, Switzer, and others, laboured with success in improving the operations, and unfolding the principles of the art; and these were succeeded by Abercrombie, Speechly, and a host of writers, who added greatly to our stores of knowledge. In 1805 was established the Horticultural Society of London, which was followed, in 1809, by the institution of the Caledonian Horticultural Society at Edinburgh; and in their train have sprung up a multitude of provincial gardening societies, all of which have given an impulse to the public mind, and stimulated the exertions of individuals. Experimental gardens have been formed, in which, amongst other things, the important task of distinguishing and classifying the numerous varieties of our hardy fruits has been zealously prosecuted. The mass of information now collected is very great, and the labour expended in its diffusion unwearied. Judging from the literature of the day, and passing downwards, from the sumptuous Transactions of the Metropolitan Society, through the numerous periodicals, to the penny Information for the People, we shall scarcely find any art, however nationally important, which receives more attention, or on which the liberality of the wealthy is more abundantly bestowed. The public nursery gardens, too, both at London and elsewhere, establishments intimately connected with our subject, and which, in a manufacturing nation, are not the least wonderful amongst the applications of skill and capital, prove the extent and perfection to which gardening has advanced. Although, however, there is not, perhaps, in the annals of invention, a chapter of higher interest than the history of Horticulture, the limits prescribed to us do not permit us to enter further into details: we must therefore refer to the late eminent Mr Loudon's *Encyclopædia of Gardening*, a work which, for minuteness of exposition, copiousness of illustration, and general accuracy, is perhaps unrivalled amongst the didactic treatises of our times.

We intend to confine our attention almost exclusively to the horticulture of Great Britain, and we shall endeavour to give such an exhibition of its practice as may suit the middle districts of the island. The objects of culture are so numerous, the operations so varied, and the materials so copious, that, in presenting what can claim only the character of a sketch of our subject, it will be necessary to follow a plan of selection. It would be unprofitable to describe *all* the methods of culture to be found in practice at the present day; we shall therefore notice such only as are deemed the best.

The subject naturally divides itself into the Fruit, the Kitchen, and the Flower Garden; but as the first two generally occupy the same locality, or are intermingled with each other, and as every thing connected with their formation is inseparably involved, we shall, to some extent, take them together. Then will follow the Flower Garden; and, by way of conclusion to the whole, a short Kalendar of monthly operations.

FRUIT AND KITCHEN GARDEN.

PRELIMINARY REMARKS.

In this compartment are cultivated the articles which are necessary for the supply of the kitchen and the dessert table. It is inclosed with walls, not only for the sake of security and general shelter, but, in our climate, as affording the means of cultivating many of the finer fruits, by training the trees close to the walls. It is generally furnished with hothouses, melon-frames, and similar contrivances, by which the fruits of warmer climates are subjected to an artificially increased temperature, and thus brought to maturity. The size of a walled garden ought evidently to bear some proportion to the splendour of the mansion-house, of which it is an appendage, to the extent of the park, the means of the family, and the supply of vegetables and fruit expected from it. Where the demand is large, such a garden should not comprehend less than from four to six acres. In many places this extent will not afford an adequate supply of culinary vegetables, but some of the bulkier crops, such as peas, potatoes, and turnips, may be raised in the orchard, or on the home farm. From an acre and a half to three acres may be regarded as forming a respectable middle-sized garden; but, within the limits already mentioned, it is better, in the first formation of a garden, to inclose too large than too small a space.

The productiveness of such an establishment will depend chiefly upon the natural fertility of the soil, and the favourable kind of situation, but also, in a considerable degree, upon the labour bestowed upon the culture, and the quantity and quality of the manurial agents employed. Where a garden is *underworked* (to use a gardener's phrase), the finer products must necessarily be scanty, for whatever requires care requires time; and it not unfrequently happens that a gardener fails in some crop, not from defect of method or skill, but because he had not been able to overtake it, or has been obliged to make his preparations in a hurried and insufficient manner. All circumstances being favourable, a British garden is perhaps unrivalled in fertility by any cultivated spot in the world. A copious supply of esculents flows into the kitchen at all seasons; and after a rich abundance of fruit has been afforded during summer and autumn, the winter stores may be easily prolonged till the early forced fruits come again to the table.

We shall first treat of the general properties and appendages of the Fruit and Kitchen Garden.

Situation.—The position of the garden in relation to the mansion-house properly belongs to the province of Landscape-Gardening, as it obviously should be in keeping with the general features of the park scenery. There should, whenever practicable, intervene a lawn, or piece of green sward, of larger or less dimensions; and great attention should be paid to the original formation of such lawn. After the surface of the ground has been levelled and made fine, a selection of grass-seeds, comprising the following (calculated for half an acre) should be adopted :—Lolium perenne tenue, 10 lb.; Trifolium repens, 3 lb.; T. minus, 1 lb.; Cynosurus cristatus, 4 lb.; Festuca duriuscula, 2 lb.; F. ovina tenuifolia, 1 lb.; Poa nemoralis, 2 lb.; P. nemoralis sempervirens, 2 lb.; P. trivialis, ½ lb.; and Avena flavescens, ½ lb. If the soil be light or sandy, more of the fescue-grasses (Festuca) may be sown, and ½ lb. of Lotus corniculatus added. It may, in general, be remarked, that, as a place of interest to every well-informed proprietor, the garden should be so near to the mansion, as to be conveniently accessible on foot, probably within little more than a quarter of a mile; while it should be so distant as to avoid the possibility of offence, arising from the necessary gardening operations, and the resort of workmen. A position on one side of the house is to be preferred, unless a much more eligible one occur in the rear. Wherever it be placed, it should be so masked by evergreen shrubs, and by trees, as not to be visible from the principal lawn, or from the walks in the shrubbery and flower-garden. If the surface of the domain be undulated, the garden is almost unavoidably seen from some point or other, and the *coup d'œil* of the inclosure walls is apt to present the idea of a huge box; an unpleasant impression, which should by all means be avoided or lessened by plantations judiciously introduced.

Ground possessing a gentle inclination toward the south or south-west is desirable. On such a slope effectual draining is easily accomplished, and the greatest possible benefit is derived from the sun's rays. The lower part of a gentle declivity is in some cases to be preferred; but a very low situation should scarcely be chosen, as the subsoil is apt to be damp; fogs often brood over such spots, and frosts are more injurious there than on higher ground. It is beneficial to have an open exposure towards the east and west, so that the garden may enjoy the full benefit of the morning and evening sun.

Shelter is absolutely necessary; and that afforded by natural objects, such as rising grounds, is the best. Where this is wanting, its place should be supplied by masses of forest-trees, disposed at such a distance, however, as not to shade the wall-trees, perhaps not nearer than 150 feet. The chief purpose of such screens is to break the force of the winds; and as every situation is, in this respect, liable to some peculiarities occasioned by the general structure of the country, or by the reverberation of aërial currents from adjacent eminences, these peculiarities should be carefully observed and obviated. The idea that crowded plantations increase the warmth of a place is often fallacious; and sometimes they do more harm than good, by encouraging blight. The trees employed may be of a varied character, but the lime, horse-chestnut, beech, sycamore, weeping birch, oak, and the smooth-leaved wych elm, should prevail. There may also be a proportion of evergreen trees, such as firs and other pines, hollies, and evergreen oaks. When these masses of wood are planted at the time the garden is formed, poplars, larches, and other fast-growing trees, should be thickly intermixed to act as temporary screens or nurses, which are afterwards to be taken out, as the permanent trees advance to maturity. Walls immediately around the garden, and low hedges intersecting the compartments, are highly useful in preventing radiation during clear nights, which always produces great additional cold.

Water.—A supply is most necessary. Where a streamlet can be made to flow through the garden, and keep a central pool constantly full, it will conduce both to utility and amenity. In many places such a streamlet cannot be commanded; but water may be collected from the roofs of buildings, or conducted in pipes from springs or sources higher than the general level of the garden, and collected in a tank in the upper part of the inclosure. Supposing the garden to have a slope to the south, water might not only be supplied from such a tank for ordinary garden purposes, but might be made to irrigate different quarters in succession. The late Mr Knight of Downton was in the practice of irrigating with great advantage his strawberry beds while in flower, the rows of celery and of broccoli, and of other crops transplanted during summer; and particularly the late crops of peas, the irrigation of which tended to prevent mildew, and to insure the production of healthy green peas during the month of October. A pipe of sufficient calibre should be led from the pool or tank to the hothouses, and to two or three different stations in the garden. Well or spring water should be exposed in reservoirs to the action of the sun and air, when it becomes comparatively soft and salubrious for plants. As rain water is found better than any other for this purpose, all that can be collected should be stored in cisterns and kept for use.

Approach.—Connected with the situation is the *approach* to the garden from without, a matter requiring some taste and contrivance. If possible, it should be from the south, when the range of glazed houses, always fronting the south, will be seen at once, and produce a pleasing effect. Sometimes a lateral entrance is very suitable, leading, it may be supposed, from the flower-garden through an intermediate shrubbery, and coming upon the hothouses in flank. It is delightful to be introduced at once and by surprise into a slip, as it is called, where on the one hand there is an extent of wall covered with luxuriant fruit-trees in full bearing, and on the other is displayed a rich collection of ornamental shrubs and large perennial border-flowers.

Form.—The shape of a garden, it is obvious, must chiefly be determined by the nature of the situation, and the taste of the proprietor. In general, gardens are either squares or oblongs, chiefly, it is presumed, because walls of this configuration contain the greatest space within the least perimeter, a result of very questionable value. They may be of any form, with this limitation: that attention should be paid to facilitating the transport of manures and garden products; for when the grounds are straggling, or complicated in structure, the labour of cultivation is much increased.

Exterior Fence.—Most gardens are encircled by an outer boundary, formed by a sunk wall or ha-ha, surmounted by an invisible wire-fence to exclude hares, or by a hedge or paling. Occasionally this sunk wall is placed on the exterior of the screen plantations, and walks lead out among the trees, to give favourable views of the adjacent country. Although the interior garden necessarily receives its form from the walls, the ring-fence and plantations may, with propriety, be adapted to the shape and surface of the ground. The spaces between the outer fence and the walls are, as already noticed, called *Slips*, and, where circumstances render it eligible, a considerable extent of ground is sometimes included, and appropriated to the culture of small fruits and kitchen vegetables. If possible, the gardener's house should be situate here, as being convenient for him, and as tending to scare depredators.

Walls.—For the production of the finer fruits, such as peaches, apricots, figs, hardy grapes, and most of the delicate French and Flemish pears, the aid of walls is indispensable in our climate. Indeed, in the northern and higher parts of the country, where there is no walled garden, the dessert can seldom consist of more than small fruits, such as gooseberries, with some apples and pears. So valuable in this respect are walls, that it is perhaps a matter of surprise that they have not been multiplied by the erection of slight and cheap structures, such as are common in the peach-gardens in France. The north inclosure wall having, towards the interior of the garden, a south aspect, is of course appropriated to the more tender kinds of fruit-trees; where, it is generally estimated, they enjoy an increased temperature equal to 7° of south latitude. The east and west walls are set apart for fruits of a somewhat hardier character: while the inner face of the south inclosure wall, having a north aspect, is well adapted for retarding Morella cherries and currants.

The north inclosure wall is generally placed nearly perpendicular to the meridian, that is, so as to have the sun directly in front at 12 o'clock. Minute directions have indeed been given to make it face towards 11 or 11½ A.M., on the ground that thus it would sooner meet the rays of the morning sun; but it does not appear that this arrangement has been the subject of direct experiment; and certainly the arguments by which the superiority of this aspect is supported, are far from being satisfactory. The east and west walls are commonly placed at right-angles to that already mentioned, but they may follow the shape of the ground, and if this slope to the south, they descend with the declivity. The south inclosure wall affords on the outside a valuable aspect to the south, which is deserving of particular attention, the finest fruit being often here produced. It is presumed that all the walls are to be covered, both within and without, with trees trained *en espalier*.

Different portions of the inclosure wall are always built of different heights; and this variation of height is the more necessary when the ground approaches to a level. In such a situation, and when the inclosure does not exceed two acres, the north wall may rise to the elevation of 14 feet; the walls on the east and west may be two feet lower, and the south wall need not exceed 10 feet. In larger gardens, the walls are generally made proportionally higher: on the north, perhaps 16 feet, on the east and west 14, and on the south 12. In several excellent Scottish gardens, planned by the late Mr Hay, such as that at Castle Semple, a piece of building is made to project diagonally outwards from the corners where the walls meet at right-angles. This projection is 16 or 17 feet in length. It serves to strengthen the fabric, and, at the same time, acts as a *brise-vent*, breaking the force of the winds which sweep around walled gardens.

Walls inclined to the horizon have been recommended by Desaguliers, Hoffels, and others; but, independently of the theoretical objections which might be urged against them, and which, in actual practice, would probably counterbalance their supposed advantages, they must be inconvenient from their bulk, or the large space which they occupy; and hence they have never come into general use. Where, however, the natural slope of the ground is too great for carrying on the ordinary operations of gardening, sloping terraces may advantageously be converted into a kind of inclined wall, to be faced with slate or some other material that does not readily absorb moisture.

Bricks afford the best and the most kindly material for garden-walls. Being rough and porous, they absorb radiant caloric, and, being bad conductors, they accumulate heat; when thus rendered warmer than the ambient air, they rapidly part with the extra heat, and maintain the temperature amid the branches nailed to the wall; they do not retain moisture, and, by their numerous interstices, they furnish every facility for nailing in the twigs of the fruit-trees. Where freestone (that is, sandstone capable of being easily dressed) is abundant, the exterior wall is often formed of coursed masonry, and the interior is faced with bricks. The foundation should, if possible, be formed of stone. Whinstone (that is, either the greenstone or the basalt of mineralogists) forms an excellent material for fruit-walls. It is susceptible of a neat hammer-dressing; it does not readily imbibe moisture, and therefore is not much cooled by evaporation: and being of a very dark colour, it absorbs more solar heat during sunshine than a lighter surface, while at night the radiation from both is nearly the same. Different parts of the principal fruit-wall of the Horticultural Society's Garden at Edinburgh are built of brick, of freestone, and of greenstone; and the plants trained against the greenstone portion have evinced, by their growth and earlier maturity, that they enjoy a somewhat superior temperature.

For the preservation of the walls, a coping is necessary; and it seems a matter of indifference whether it be formed of stones with a rounded surface, or of flat pavement, or of tiles. Probably it should not project more than an inch, though some contend for a larger measure, on the ground of its preventing, to some extent, the radiation of heat from the tree towards the sky in clear nights, and also affording shelter from the perpendicular deposition of dew. Temporary copings of wood are often adopted, and are found to answer every good purpose. They are put on in spring, to protect the tender blossom and embryo fruit from the hoarfrosts, and when danger is past are removed, to give free access to the genial showers and sunshine of summer and autumn.

Hot Walls.—A considerable proportion of the walls of every good garden, especially in the north, should be constructed with flues to supply the means of applying artificial heat. The additional expense is trifling; and in cold seasons and cold situations, the aid of this species of wall is nearly indispensable for the regular ripening of grapes, peaches, apricots, and figs, as exemplified at Erskine House on the Clyde, where, with the assistance of a little fire-heat, large and high-flavoured black Hamburgh grapes are produced, and where Mayduke cherries have been ripened at least six weeks before the usual period. The application of fire-heat for a few weeks in spring will secure the setting of the fruit, and the same operation continued for a short time in autumn will suffice to ripen it, and also to prepare the young wood for the next year. The flues may be about twenty inches deep, and should make as many horizontal turns as the height of the wall will permit. One furnace will be enough for a surface fifty feet in length. When the boundary walls do not furnish room sufficient for the production of the finer fruits, cross walls are built athwart the garden from east to west, of the same height as the side walls, to which they nearly approach. They are generally flued, and are sometimes furnished, on their southern aspect, with sloping glazed frames, either fixed or moveable. These cross walls add greatly to the capabilities of a fruit-garden, and are useful in affording additional shelter to the small fruits and crops of vegetables in the culinary quarters.

Espalier-Rails.—Subsidiary to walls as a means of training fruit-trees, espalier-rails were formerly much employed, and they still prevail in many parts of the country. In their simplest form, they are merely a row of slender stakes of ash or Spanish chestnut, driven into the ground, and connected by a slight rod or fillet at top. In some gardens the perpendicular rods are fastened into two horizontal rails, supported by strong posts, which are battened into stones. Cast-iron rails have also been proposed. The framework is sometimes inclined to the horizon, or adapted to a sloping bank, as in the gardens of the Earl of Selkirk at St Mary's Isle; where some of the trees, although so trained more than sixty years ago, are still in a healthy condition, bearing abundant crops of fruit. In other cases the framework is placed flat like a table, and, when there is plenty of room, this proves a good arrangement. Espalier-rails, especially the more elaborate sorts, are expensive and formal, and therefore, in many instances, have given place to dwarf standard trees, which are equally productive, and far more elegant in their appearance.

Soil.—It is of great importance that the ground selected for a garden should be naturally of a good quality. A hazel-coloured loam, of a light or sandy texture, is well adapted for most crops, whether of fruits or culinary vegetables. Porosity is indispensable, not only for the transmission of moisture, but of air, to the roots of plants. As it is more easy to render a light soil sufficiently retentive, than to make a tenacious clay sufficiently porous, a light soil is preferable to one which is excessively stiff and heavy. It is advantageous to possess a variety of soils; and if the garden be on a slope, it will often be practicable to render the upper part light and dry, while the lower remains of a heavier and damper nature. The soil should be good to the depth of two feet, and any necessary additional deepening by manures or otherwise, should not be neglected. The nature of the subsoil demands particular attention. If it be strongly impregnated with metallic substances, or composed of cold *till*, it will prove pernicious to the roots of fruit-trees, and will scarcely admit of a remedy. A decomposing rock, or a bed of sand, is preferable. Perhaps the best of all is a dry bed of clay, overlying sandstone, which crops out within the general inclosure. If the inferior strata be retentive, and if water lodge in any part of the garden, draining should be carefully executed, so as to carry off the superfluous moisture.

Preparatory to the distribution of the several parts of a garden, it is proper that the ground be trenched to the depth of two feet at least; but the deeper the better. In this operation all stones larger than a man's fist are to be taken out, and all roots of trees, and of perennial weeds, are carefully to be extracted and cleared away. When the soil is not tolerably good to the depth of two feet, it will generally be proper to remove a portion of the subsoil; and its place should be made up by a proportional quantity of turf or fresh loam from the fields. If the subsoil be gravel, and the upper layer sandy, the additional earth should be clayey loam, or the scourings of ditches; but if the original body of soil be of a compact texture, the materials introduced should be mixed with sand, marl, and other light opening substances. When the whole ground has been thus treated, a moderate liming will, in general, be useful. After this, supposing the work to have occupied most of the summer and autumn, the whole may be laid up in ridges, and left in this state for several months, to expose as great a surface as possible to the action of the winter's frost. The draining, trenching, and other operations here recommended, will unavoidably be attended with considerable expense, and this expense will not immediately be followed by any perceptible beneficial result. The lapse of a few years, however, will develop the vast advantages of such a mode of procedure, which, if it have been neglected at first, cannot be practised at a subsequent period but with indifferent success, and not without an increase of cost and labour.

Manures, &c.—In enumerating the general appendages of gardens, it may be proper to say something of manures; but we do not consider it necessary to enter into minute details on this subject. Where there are extensive melon grounds, an abundance of stable and other litter is required; and this substance, in its partially decomposed state, as afforded by exhausted hotbeds, supplies a manure well adapted to aid the processes of vegetation. Decayed leaves, which are plentiful where there are extensive pleasure-grounds, and which should be carefully swept together, and collected into a heap in the autumnal months, also form an excellent manure for many purposes. Some practical men prefer composts to simple dungs, or such substances as have undergone fermentation. For fruit-trees, turf from rich pastures, mixed with vegetable earth, is perhaps the best stimulant that can be applied. It is questionable whether any sort of trees are permanently benefited by the application of crude manures to their roots; and it is certain that many have been irremediably injured by this practice. But whatever caution may be necessary in their use, the prudent horticulturist will find it expedient to pay constant attention to the collection and accumulation of manures. Liquid manures, or the drainings of the stable and cow-house, are valuable, yet too often neglected. To fix the ammonia, Professor Liebig recommends their being passed through a filter, formed of fragments of gypsum, which should be occasionally renewed. The garden cannot go on long without manures; for ground which is exhausted by continual cropping, requires to be continually repaired. A compartment for the preparation of manure, and storing of vegetable and peaty, or other soils, is necessary; and part of it should be covered with a shed, so that moderately dry earth may not be wanting for the early forcing of cucumbers and melons in the spring, and for similar purposes.

Internal Arrangement.—In gardens of the superior class, a considerable portion of the north wall, or of the cross wall, is covered in front with glazed structures, called hothouses or forcing houses. To these the houses for ornamental plants are sometimes attached; but the last are more appropriately situate in the flower-garden, when that forms a separate department. It is well, however, that every thing connected with the forcing, whether of fruits or flowers, should be concentrated in one place. The melonry, and pine-pits, should occupy some well-sheltered spot in the slip, or on one side of the garden, and, if possible, in the neighbourhood of the stable-yard. Adjoining to this may be found a suitable site for the compost ground, in which various kinds of soils may be kept in store, and composts may be prepared, as already hinted.

Extensive gardens, in exposed situations, are often divided into compartments by hedges, so disposed as to break the force of winds. Where these are required to be lofty, yet narrow, holly, yew, or beech are preferred; but if space be no object, common laurel is one of the most beautiful plants that can be employed for this purpose. Small hedges may be formed of evergreen privet, or of tree-box. These subordinate divisions, though often neglected, are worthy of attention; for, in addition to shelter, they furnish shade from the sun's rays, which, at certain seasons, is peculiarly desirable, and they obviate radiation to a considerable extent.

The laying out of the area of the garden in walks, borders, and compartments, may be regulated very much by the shape of the ground, and the taste of the owner. In general, a gravel walk, six or eight feet broad, is led quite around the garden, both within and without the walls. A walk of similar dimensions is often constructed in the centre of the garden in the direction of the glazed houses, and this is sometimes crossed by another at right angles. At times these walks are led diagonally from the corners. The space between the wall and the walk that skirts it, is called the wall-border, and is commonly from fifteen to twenty feet broad. On the interior of the walk there is usually another border five or six feet broad, which is generally occupied by fruit-trees trained to espalier-rails, or by dwarf standard trees. The middle part of the garden is divided into rectangular compartments for the raising of the various culinary crops. These compartments may be divided by rows of moderate-sized fruit-trees, or of gooseberry and currant bushes. It is advantageous to form several small beds, in which to cultivate the less bulky articles, such as basil, sage, tarragon, spearmint, and thyme, which, in large spaces, are apt to be overlooked or neglected.

Wall-Borders.—The preparation of borders for fruit-trees is a matter of the utmost importance, and no pains should be spared in this essential operation. Where borders are not in good condition, the care and toil of the most experienced gardener will avail but little toward the production of fruit. The first object is effectual draining. The next, if the subsoil be indifferent, is the confining the trees to the good surface soil, by the formation of a bottom impervious to their roots. This is sometimes done with stone-shivers and lime-rubbish, or with coal-ashes and clay, compacted by treading with the feet, and beating with the back of a spade. Loudon recommends successive layers, an inch thick, of clean gravel, pulverized earth, and then gravel, well watered and firmly compressed by means of a heavy roller. Good soil to the depth of two feet and a half, or three feet, is placed over this impervious bottom. Three-fourths rich loam, and one-fourth light sandy earth, form a mixture congenial to the generality of fruit-trees. In selecting the soil, regard may be had to the particular trees which are to cover different portions of the wall. Thus, a heavy soil may be allotted to pears and plums; loam of a medium character, inclining to be strong, to peaches, nectarines, and apricots; and a lighter earth to cherries and figs. Above all, care should be taken to render the borders sufficiently rich and substantial. Whilst every skilful horticulturist may, in various ways, reduce the luxuriance of his trees, nothing can compensate for extreme poverty in the soil. The same principle will dictate moderation in cropping wall-borders with culinary vegetables; a practice in which gardeners are apt to exceed, from a desire to furnish very early crops of peas, turnips, cabbages, or potatoes. Lettuce, endive, or small salad plants, do little harm.

Orchards.—Within the limits of the greater proportion of large gardens, such a number of dwarf standard trees may be planted as will prove sufficient to afford a supply of fruit for an ordinary family. Where, however, this is not the case, it is desirable that there should be a separate orchard. A situation similar to that of a garden, and the same preparatory operations, are necessary: but a simple hedge will, in most situations, suffice for a fence. The trees may here be on free stocks and trained as high standards, but the taller growing pears and apples are best suited for a large orchard. Thoresby in his Diary, under date of March 1702, mentions, as a novelty, an orchard "kept in the new order of dwarf trees," evidently intimating that dwarf standards were introduced from Holland by the Prince of Orange at the time of the Revolution. When an additional supply of culinary vegetables is required, they may be cultivated in the orchard; and then the trees should be planted in rows, with considerable intervals between the rows, otherwise the close quincunx order is preferable. In any circumstances, the trees should not be choked up with currant and gooseberry bushes, as is too common in market gardens. A few plums, cherries, and geans are commonly introduced; and on the margin may be planted walnuts, chestnuts, filberts, and any others less commonly cultivated, or the fruit of which is not much in demand. The whole should be effectually screened from the prevailing winds, by rows of forest trees; at a sufficient distance, however, to prevent shading by their branches, or the robbing of the soil by their roots.

THE FRUIT GARDEN.

We shall first direct our attention to the culture of hardy fruits, or of such as, in our climate, do not, to an extensive degree, require the assistance of artificial heat. But before proceeding to a minute detail of the management of the different varieties, it may be proper to attend to some of the operations which are common to all.

The Preliminary Operations may be classed under the heads Propagation, Planting, Training, and Protection of Blossom.

PROPAGATION.

Propagation by Seed.—Although fruit-trees are furnished with all the natural means of reproduction, it is not in general expedient to attempt to propagate them by the sowing of seed. This method is found to be equally tedious and precarious, requiring the labour of a good many years, and very rarely producing an exact copy of the fruits from which the seeds are taken. The chief reason of the variation is pretty obvious: the blossoms of different varieties of the same species of fruit are commonly expanded, at the same period of time, in the neighbourhood of each other, and the pollen of one kind is thus extremely apt to be transferred, by the agency of bees and other insects, to the stigma of another kind. If, therefore, we desire to procure uncontaminated seed of an excellent variety, such as the Ribston apple, we ought to encircle the blossom-bud with a fine gauze bag, sufficiently wide to allow the blossom to expand, and not remove the covering till the fruit be fairly set. Another source of variation is to be found in the influence of the stock upon the graft, which is real, though not easily detected, except in extreme cases—such as grafting Scotch apples upon stocks of the Russian transparent, and finding the former acquiring the transparent character. To obviate this the tree should stand on its own bottom, or be struck from a cutting. All our present admired fruits are regarded as seminal varieties obtained from the wild inhabitants of the forests, which have been trained into an artificial condition; and when sown seem to have a tendency to resume their original constitution. In the peach-orchards of America, for instance, which are planted with the kernels of choice sorts, there are seldom more than a few trees affording fruit fit for the table: the produce of the majority being so worthless, that it is usually employed for feeding hogs. Notwithstanding this embarrassing circumstance, there are some considerations which render this mode of propagation at once interesting and important to horticulturists. It is the only way by which we can procure new kinds to supply the place of those which are falling into decay; and to some extent it affords the means of adapting the more tender sorts to the rigour of our climate. It is well known that some of the favourite cider apples of the seventeenth century have become extinct, and others are fast verging into decrepitude; and hence the conclusion has been drawn, that all our present fruits, as they are artificial in their constitution, are also limited in their duration. Each variety springing from an individual at first, however extended by grafting or budding, partakes of the qualities of the individual: and where the original is old, there is inherent in the derivatives the tendency to decay incident to old age. It is assumed that all the individual trees of any given variety, such as the Golden Pippin, or the Grey Leadington, are in a lax sense equivalent to *one individual*. By careful management, the health and life of this composite individual may be prolonged; and grafts inserted into vigorous stocks, and nursed in favourable situations, may long survive their parent tree. Still, there is a sure progress towards extinction, and the only renewal of the individual, the only true reproduction, is by sowing seed. It is admitted by those who have paid attention to the subject that this curious principle of vegetable economy holds true, at least in so far as regards fruit-trees.

The late Mr Knight, to whom this ingenious theory is due, conceived the idea of supplying the lack of fine old varieties by semination. It further occurred to him, that advantage might be taken of that tendency which plants exhibit on repeated sowings, to adapt themselves to the climates in which they are raised, so that trees of warmer countries may thus become habituated to colder regions. He therefore devoted much of his attention to the production of improved and robust varieties; and his zeal and labours have been rewarded by the Acton Scott Peach, the Ingestrie and Downton Apples, and many others, in almost every sort of hardy fruit. Mr Knight entertained the opinion, deduced, we may presume, from experiment, that more is to be expected from hybrid varieties, than from the mere reproduction of old kinds; he therefore had recourse to the nice operation of dusting the pollen of one kind on the pistil of another. He opened the unexpanded blossom of the variety destined to be the female parent of the expected progeny, and, with a pair of fine-pointed scissors, cut away all the stamens, while the anthers were yet unripe, taking care to leave the style and the stigma uninjured. When the female blossom, thus prepared, came naturally to expand, the blossoms of the other variety destined to be the male parent were applied. Mr Knight has often remarked in the progeny a strong prevalence of the constitution and habits of the female parent: in this country, therefore, in experimenting on pears, the pollen of the more delicate French kinds, such as Crasanne, Colmar, and Chaumontelle, should be dusted upon the flowers (always deprived of stamens) of the Muirfowl Egg, the Grey Achan, the Green Yair, or others, that are hardy, or of British origin.

As this is a subject of interest, we may state some of the precautions adopted by Mr Knight and his followers, in conducting their experiments. It is, in the first place, a rule to employ seeds of the finest kinds of fruit, and to take them from the largest, ripest, and best flavoured specimens of the fruit. When Mr Knight wished to procure some of the old apples in a healthy and renovated state, he prepared stocks of such good sorts as could be propagated from cuttings; planted them against a south wall in rich soil, and then grafted them with the kind required. In the following winter the young trees were taken up, their roots retrenched, and then replanted in the same place; by which mode of treatment they were thrown into bearing when only two years old. Not more than a couple of apples were allowed to remain on each tree, and these, in consequence, attained a larger size and more perfect maturity. The seeds of these apples were then sown, in the hope of procuring an equally excellent offspring. In the case of cross-impregnation, every seed, though taken from the same fruit, produces a different variety, and these varieties, as might be anticipated, prove to be of very various merit. In general those seeds are to be preferred which are plump and round. An estimate of the value of the seedling trees may be formed, even during the first summer of their growth, from the resemblance they bear, in bud and foliage, to highly cultivated and approved trees. The leaves of promising seedlings improve in character, becoming thicker, rounder, and more downy every season. Those whose buds in the annual wood are full and prominent, generally prove more productive than those whose buds are small and seemingly shrunk into the bark. Early flowering and hardy blossoms are desirable characters. It has been observed, that even after a seedling tree has commenced bearing, its fruit has a tendency to improve as the tree itself acquires vigour, so that, if, in the first season, there is any considerable promise, a great melioration may be expected in succeeding years.

The slowness with which seedlings reach the bearing state, has been the subject of complaint among horticulturists, and indeed is the principal reason why this mode of propagation has not been more frequently practised. According to Mr Knight, the pear requires from twelve to eighteen years to reach the age of puberty ; the apple from five to twelve or thirteen years ; the plum or cherry four or five ; the vine three or four ; the raspberry two years. The peach he found to bear in two, three, or four years. The period, however, must depend greatly on the soil, situation, and mode of culture. The great means of accelerating the epoch of bearing, seems to be, to make the trees grow vigorously when young. Crude manures are indeed to be avoided ; but vegetable earth, and, above all, a liberal supply of rotted turf, are wholesome and excellent stimulants. The seed-bed, and the ground on which the seedlings are transplanted, should be extremely well worked and comminuted with the spade, and should not be too much exposed to the parching rays of the sun and withering action of the wind. Great care ought to be taken to prevent the young plants from becoming stunted. In pruning, the small twigs in the interior should be removed, so as to relieve the tree from the bushy appearance which it is apt to assume. It has been recommended to transfer scions and buds of promising individuals into other trees in a bearing state. This is peculiarly advantageous with respect to the peach and other stone fruits, as it both hastens the period of puberty, and economises the space which must be occupied on the wall.

Propagation by Cuttings.—Gooseberries, currants, figs, vines, and some others, are increased by means of cuttings. An annual shoot is taken off along with a thin slice, or *heel*, as it is called, of the former year's wood, which is found to facilitate the production of roots. The cuttings are placed firmly in the soil, at various depths, according to their length; the buds or eyes which would thus come beneath the surface having been previously removed. Vines should always be propagated from single eyes, leaving 2½ inches below the bud and ½ inch above. When propagated in this manner much finer plants are produced than those from common cuttings which have two eyes. Most of the codlin apples may be increased by cuttings; and even large branches of those which produce *burs*, may be planted at once, with success. In all deciduous trees the operation is most advantageously performed in winter.

Propagation by Layers.—This is not much resorted to in the fruit garden. It is occasionally employed as the means of dwarfing trees. "Layering," says Professor Lindley, "is nothing but striking from cuttings which are still allowed to maintain their connection with the mother plant by means of a portion at least of their stem." The operation is performed by bending down a branch to the earth, and pinning it there with hooked pegs. A few inches from the extremity a notch or slit is cut upwards, generally from the insertion of a bud. Sometimes the shoot is pierced with a number of holes; a wire is bound round it; or even a ring of bark is removed. The object of these expedients is to retard the descending sap, and thus promote the formation of radicles, or young roots.

This is also aided by bending the branch upward from the point at which the roots are wanted; and the whole branch, except a few buds at the extremity, is covered with soil. The seasons best fitted for these operations, are early in spring and about midsummer; that is, before the sap begins to flow, and after it has completely ascended. One whole summer, sometimes two, must elapse before the layers can be expected to be fully rooted, or ready to be taken off.

Propagation by Grafting.—When a shoot or young branch of one tree is inserted into the stem or branch of another, and, by the influence of vegetation, is made to coalesce with it, the process is termed grafting. In this manner apple and pear trees are commonly propagated; plum and cherry trees are sometimes also grafted, but these last are more generally propagated by budding.—Our attention must here be directed to the *stocks* into which the shoots or scions, as they are called, are inserted; to the *scions* themselves, and to the *mechanical operations* employed in grafting.

The *stocks* should be of the same *genus* to which the graft belongs, or, at least, of close affinity in natural family. The following are the principal kinds of stocks, including, by anticipation, such as are used in budding. For *apples*, seedlings of the crab apple, layers of the doucin or paradise, and of the codlins, with cuttings of the bur-knot varieties. For *pears*, seedlings of the common and wilding pear; with seedlings or layers of quince. For *plums*, seedlings of any of the common sorts, particularly the Brussels, and the Brompton; also the Bullace plum. For *cherries*, seedlings of the small black cherry or gean, Prunus avium; and, for dwarfing, P. Mahaleb. For *apricots*, seedlings of the wilding apricots, with the muscle and Brussels plum. For *peaches* and *nectarines*, seedlings of the muscle, white pear-plum, and Damais noir plum, the almond, and the wilding peach.

Stocks are commonly divided into two classes, viz., *free stocks* and *dwarfing stocks.* The former consist of seedling plants, which naturally attain to the same size as the trees from which the scions are taken. The latter are plants of diminutive growth, either varieties of the same species, or species of the same genus as the scion, which have a tendency to lessen the expansion of the engrafted tree. The Paradise or Doucin is the usual dwarfing stock for apples, the Quince for pears, the Bullace for plums, and Prunus Mahaleb for cherries. The nature of the soil in which the grafted trees are destined to grow, should also have weight in determining the choice of stocks. When the garden is naturally moist, it is proper to graft pears on the quince, because this plant agrees with a moist soil, and at the same time the luxuriance thereby produced is checked by the stock. In France, peaches are commonly budded on almond stocks, to adapt them to the dry soils of that country. The seeds from which stocks are to be raised, are generally sown in beds in March; but the germination of some kinds is promoted by placing the seed, for a time, in damp sand in a greenhouse. Next season the seedlings are transplanted into nursery rows, in which they are allowed to reach the size necessary for the various forms of fruit-trees hereafter to be mentioned.

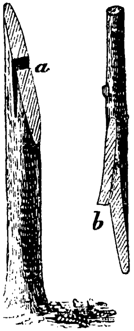
The *scion* is always a portion of the wood of the preceding year. As the diseases incident to fruit-trees are apt to be transmitted by this mode of propagation, it is desirable that the parents should be as healthy as possible. In the shy-bearing kinds it has been found beneficial to select shoots from the fruitful branches. The scions should be taken off some weeks before they are wanted, and half-buried in the earth, as it is conducive to success that the stock should, in forwardness of vegetation, be somewhat in advance of the graft. During winter, grafts may be transferred from great distances, as from America, or any part of the Continent of Europe, if carefully wrapped in hypnum moss. If they have been six weeks or two months separated from the parent plant, they should be grafted low on the stock, and the earth should be ridged up around them, leaving only one bud of the scion above ground. Out of forty scions of new Flemish pears, procured by the deputation of the Caledonian Horticultural Society from Brussels and Louvain, in 1817, and treated in this way, only one failed.[1]

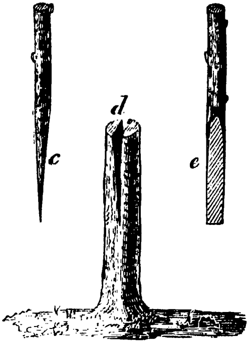
Success in *grafting* depends almost entirely on accurately applying the inner bark of the scion to the inner bark of the stock, so that the sap may pass freely from the one to the other. They are therefore fitted together, and held fast by a bandage of strips of bast matting. To lessen evaporation, a portion of ductile clay is moulded around the place of junction, and is retained until it appears, from the development of leaves, that the operation has succeeded. The best season for grafting is the month of March; but it may be commenced as soon as the sap in the stock is fairly in motion, and may be continued during the first half of April.

---

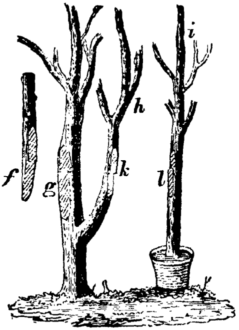
[1] Among these were Beurré Ranz, Marie Louise, Capiaumont, Napoleon, Delices d'Hardenpont, Passe Colmar, and some others, which have acquired a high character in this country.

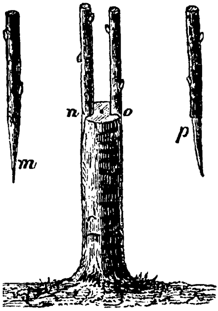
The most usual mode of grafting is called *whip-grafting*, or *tongue-grafting*, *a*, *b*. The top of the stock and the base of the scion are cut off obliquely at corresponding angles, as nearly as can be guessed by the eye; the tip of the stock is then cut off horizontally; next a slit is made downwards in the centre of the sloping face of the stock, and a corresponding slit upwards in the corresponding face of the scion. The tongue or upper part of this sloping base is then inserted into the cleft of the scion, and so adjusted that the inner bark may unite neatly and exactly on one side. The junction is then tied up and covered with clay. Several other methods may be mentioned, such as *cleft-grafting*, *c*, *d*, *e*, in which the scion is sloped at the base, and inserted like a wedge into a cleft in the





stock. *Side-grafting, f, g,* which resembles whip-grafting, but is performed on the side of the stock without heading it down. *Crown-grafting,* in which the scions *m, p,* are inserted between the bark and the wood of the stock. *Grafting by approach,* or *inarching,* resembling whip-grafting, but the scion *h* remains attached to the parent plant, till its union at *k* and *l* with the new stock *i* be complete; when that portion of the stock above the union may be headed down, and the scion at the same time detached from the parent plant.

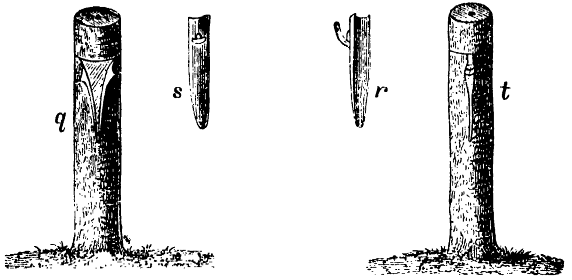




It is evident that the method of performing the operation may be diversified to a great extent. The late M. Thouin of Paris described, in the "Annales du Museum," nearly fifty *greffes;* but little practical utility results from such nice distinctions. It is of great importance that the horticulturist should be expert in the manipulation of the more common forms, such as those above enumerated. An extensive fruit-garden requires a frequent repetition of the operation, in order to secure proper kinds, and productive branches. At Dalkeith Park, the late Mr Macdonald, the excellent head-gardener there, was in the practice of annually inserting, on his established trees, numerous grafts. and by this means was enabled to overcome the disadvantages of a somewhat unfavourable situation, especially in regard to subsoil, and to obtain abundant crops of large and beautiful fruit.

Root-grafting is performed in the modes just described, only placing the scion on a piece of root (as a stalk), of proper thickness, and having fibres and fibrils attached to it. In the most unfavourable soils, some sort of fruit-trees thrive better than others ; and it has been suggested, that by using root-stocks of such flourishing trees, and grafting other desirable kinds on them, canker may often be avoided, and the better kinds of fruit produced.

Propagation by Budding.—Most kinds of fruit-trees may be propagated by budding; and there are some, such as peaches and apricots, which can scarcely be multiplied in any other manner. It consists in removing a bud with a portion of the bark from one tree, and inserting it in a slit of the bark of another tree. The season for performing this operation is in July or August, when the buds destined for the following year are completely formed in the axils of the leaves, and when the portion of bark parts freely from the wood beneath. The buds to be preferred are those on the middle of a young shoot. There are many forms of budding, but that which is simplest, and is generally practised in this country, called *Shield-budding*, needs alone be described. The operator should be provided with a budding-knife, in which the cutting edge of the blade is rounded off at the point, and which has a thin ivory or bone handle, like a paper-folder, for raising the bark of the stock. A horizontal or transverse incision is made in the bark quite down to the wood, and from this incision a perpendicular slit is drawn downwards, to the extent of perhaps an inch. The slit has now a resemblance to the letter **T** as at *q*; a bud is then cut from the tree wished to be propagated, having a portion of the wood attached to it, so that the whole may be an inch and a half long, as at *s*. The bit of wood is then gently withdrawn, care being taken that the bud adhere wholly to the bark or shield, as it is called, as at *r*, which is the reverse of *s*. The bark on each side of the perpendicular slit being cautiously opened with the handle of the knife, the bud and shield are inserted, as at *t*. The upper tip of the shield is cut off horizontally,



and brought neatly to fit the bark of the stock at the transverse incision. Slight ties of moist bast-matting are then applied. In about a month or six weeks the ligatures may be taken away, when, if the operation have been successful, the bud will be fresh and full, and the shield firmly united to the wood. Next spring a strong shoot is thrown out, and to this the stock is headed down in the course of the summer.

PLANTING.

After propagation, the next care is to transfer the young trees to those places, whether in the open border or against the wall, where they are to remain; and it is of importance that these situations should be consideratcly selected; adapting the trees, according to their character and qualities, to sites suitable in respect of soil, shelter, and aspect. Planting may be performed at any time in the beginning of winter, or in the early spring months; but it is considered that the most advantageous seasons are immediately after the fall of the leaf in autumn, and before the ascent of the sap in spring. The trees should be cautiously lifted from the nursery lines, carefully guarding against the mutilation or bruising of the roots; and, to prevent the desiccation of the fibres, they should be planted as soon as possible after being lifted. When they have to be carried to a distance, the roots should be enveloped in damp hypnum-moss. In the ground, which is presumed to have been previously trenched or otherwise prepared, pits or holes are formed, and the soil is finely pulverized; and in these the trees are placed, their roots being spread out and intermingled with the earth. Shallow planting is strongly recommended; two or three inches of soil being in general a sufficient covering. The doucin or French paradise stocks are preferable for this reason, that they throw out delicate fibres which readily spread along the surface, instead of bundles of hard roots which generally characterize crab stocks. On filling up the hole, a surface of at least an equal size is *mulched*, that is, covered with dung or litter, so as to restrain evaporation, and preserve moisture. In the case of wall-trees, a space of five or six inches is usually left between the stem at the insertion of the roots and the wall, to allow for the effects of growth. Young standard trees are tied to stakes, to prevent their roots being ruptured by the wind-waving of the stems. During the dry weather of the first summer, the trees should be watered from time to time as occasion may require.

The selection and distribution of the different kinds of fruit-trees is an important and interesting point in the formation of a garden. Regard must necessarily be had to local situation and climate, as the selection ought manifestly to be different for a garden in the south-west of England, and for one in Yorkshire or in Scotland; for one near the level of the sea, and for another elevated several hundred feet above it. The best walls, having a south or south-east aspect, are dedicated to the grape-vine, the fig-tree, the peach, and apricot. The finer varieties of French and Flemish pears require and deserve a good aspect, as also the early sorts of cherries. The later cherries, and the generality of plums, succeed very well either on an east or west aspect, in Scotland: and here the mulberry requires the protection of a wall, and several of the finer apples do not arrive at perfection without it.

The wall-trees which are intended to be permanent are called *dwarfs*, from their being grafted near the ground. Between each of these, trees with tall stems, called *riders* in Scotland, are planted as temporary occupants of the upper part of the wall. The riders should always be five or six years trained in the nursery,[1] in order that when they are planted out they may come into bearing as speedily as possible. The distance at which the permanent trees are planted is to be regulated by the known mode of growth of the different sorts, and by the height of the wall. When the walls are about twelve feet high, the following average distances have been recommended:—For vines, 10 or 12 feet; peach and nectarine trees, from 15 to 20 feet; fig-trees, 20 feet at least; apricots, from 15 to 24 feet; plums and cherries, from 15 to 20 feet; pear trees, 20 feet if on quince stocks, and 30 feet when on free stocks; apple-trees, 12 feet if on paradise stocks, and 15 to 25 feet when on free stocks. Where the walls are only seven or eight feet high, the distance should be increased by nearly one-fourth, as in this case the want of height must be compensated by greater breadth.

Apples and pears make the best espalier-rail trees, especially in Scotland. These should be of the more robust sorts, and should be planted at the distance of 15 or 20 feet. Cherries and plums are sometimes introduced into the espalier-rail row, but these succeed in those situations only where they would do equally well or better as standards.

---

[1] This is a matter very little attended to at the present day; and consequently the riders can seldom be allowed to occupy the wall for any lengthened period, the growth of the dwarfs rendering their removal necessary after a comparatively short period.

In many excellent gardens, dwarf standards are preferred to espalier-rail trees. They are placed along the inner borders at 8 or 10 feet apart. When proper attention is paid to such trees, the effect is very pleasing, each being in itself a handsome object, and generally clothed with fine fruit. Where the situation is warm, and the climate favourable, a few of such of the finer pear-trees as have hardy blossoms should be planted out in this form. Though they may fail to ripen their fruit in some seasons, they will often add greatly to the resources of the fruit-room, their produce being frequently superior in flavour to the pears grown against walls.

TRAINING.

Two functions belong to training,—that, namely, which modifies the form of the trees, and that which regulates the bearing wood, and consequently the supply of blossom. The latter, more accurately termed *pruning*, being of a varied character, adapted to the habits of the different kinds of fruit-trees, will more properly fall to be considered when treating of the peach, pear, plum, &c.; at present we shall make a few remarks on the former. The essential properties of training are, that it should be simple, not requiring frequent amputation of large branches; that it should be appropriate to the growth of the tree, and such as to promote the production of fruit. The knife is the great instrument in training, and whoever can wield it skilfully, will have a perfect command over his trees: at the same time, it may be laid down as a maxim, that it should be used with some degree of reserve, as nothing is more prejudicial to the health and fruitfulness of all sorts of trees, than severe and injudicious cutting.

Training of Standards.—Orchard-trees are generally worked in the nurseries with stems five or six feet high. All that is necessary, in pruning trees of this sort, is merely to cut out the branches which cross or press upon one another. Bushy heads should be thinned out, and those which are too lax cut back. Three or four leading branches may be selected, to pass ere long into boughs, and form a handsome skeleton for the tree; but it is useless to be over-nice in this matter, as these branches will soon grow beyond the power or regulation of the pruner, and of any artificial system which he may adopt. Dwarf standards being more accessible, are more under the dominion of training. When worked on paradise stocks, they may be kept not much superior in size to gooseberry bushes, and in a state of abundant fruitfulness. The more fanciful Dutch modes of training apple-trees, in the cup and the ball fashion, and after many other curious devices, have never been relished in Britain. In this country, they are generally allowed to grow *en buisson*, that is, as bushes. For pears, the French forms, *en pyramide*, fig. 1, and *en quenouille*, fig. 2, are justly gaining ground.

Fig. 1.

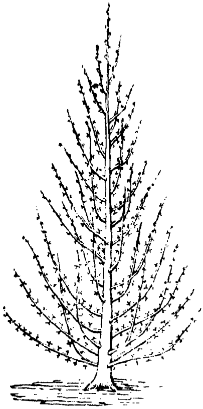
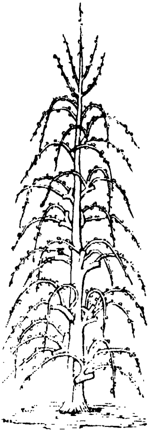


Fig. 2.



Training of Espalier-Rail Trees.—The usual form is the horizontal; that is, from an upright stem branches are led right and left along the rails. Some prefer having two stems, thus diverting the upright current of the sap into two channels, and producing a somewhat lower growth, which is favourable to fruitfulness. Espalier-rail trees have a uniform tendency to throw out a luxuriant crop of upright summer shoots; and this is to be prevented by disbudding, or rubbing off numerous buds, as they appear from April till June. Close well-placed spurs are encouraged, as from these the fruit is expected.

Training of Wall-Trees.—A fruit tree planted against a wall is evidently in a constrained and artificial situation, from which it makes continual efforts to escape. Much attention is necessary to repress this tendency, which, were it permitted to act, would disfigure the tree, and neutralize the advantages of a wall, without imparting in their place the freedom of a standard in the open ground. To be successful, the operator should be acquainted with the theory of vegetation, should study the mode of growth in different trees, and, above all, remember the purpose of all training, viz., the eliciting of bearing wood.

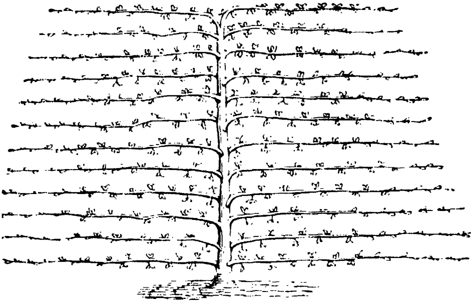
One great difficulty is to preserve equilibrium in the growth of the several parts of the same tree: for the attainment of this object, excellent hints are to be found in the *Pomone Français:* we shall mention only two or three. A shoot will grow more vigorously whilst waving in the air, that when nailed close to the wall; a weak shoot should therefore be left free, whilst a stronger antagonist should be restrained. A shoot diverging only slightly from the perpendicular, will, other things being equal, obtain a more copious supply of sap than one that is laid out horizontally, or is deflected downwards. A luxuriant shoot may be retarded for some time, by having its tender extremity pinched off, and a weaker brother thus allowed to overtake it. By these and other expedients, which will suggest themselves to an attentive horticulturist, and by the prudent use of the knife, it will be easy to execute the following forms, which, on account of their simplicity and general excellence, we select out of many to be found detailed in works on gardening.

The *horizontal* form (fig. 3) has long been a favourite in this country, having been strongly recommended in the old but excellent work of Hitt.[1] There is one principal ascending stem, from which the branches depart at right angles, at intervals of ten inches or a foot. In order to produce this form, the vertical shoot is, in trees

---

[1] Treatise on Fruit Trees, by Thomas Hitt. 8vo. 1756.

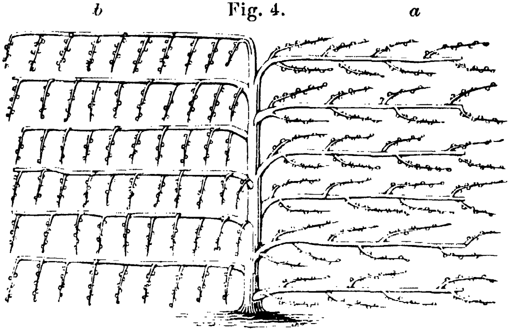
Fig. 3.



of ordinary vigour, cut back every winter to within fourteen inches of the highest pair of branches: a number of shoots are produced in the beginning of each summer, out of which three are selected: one is trained in the original direction of the stem, and one on each side of it parallel to the base of the wall. By pinching off the point of the leading shoot about midsummer, another pair may be obtained in autumn. In luxuriant trees, the vertical shoot may be left two feet in length, by which means, and by summer pruning, four pairs of branches may sometimes be added in one season. The great object, at first, ought to be to draw the stem upwards: when it has reached the top of the wall, it is made to divaricate into two, and the tree, thus completed as to its height, is henceforth suffered to increase in breadth only. Horizontal training is best adapted to those trees which produce strong shoots, as the Ribston

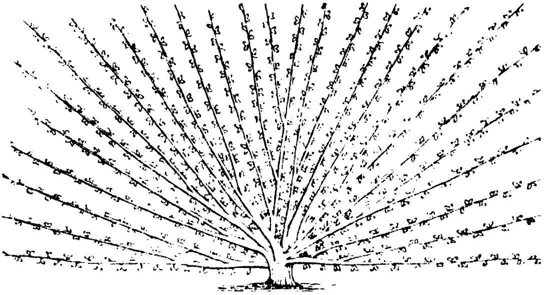
Pippin apple, or the Gansel's Bergamot pear. For the more twiggy kinds, the form represented in fig. 4 is more suitable. In this the horizontal branches are eighteen or twenty inches distant, and the small shoots are trained in between them, either on both sides, as below letter *a* in the figure, or on the under side and downwards, as below *b*. This last is an excellent method of reclaiming neglected trees of this description. Every alternate branch being taken away, and the spurs cut off, the young shoots are trained in, and soon produce good fruit. It is rather singular, that the late M. Thouin, in his account of the *Ecole d'Horticulture pratique du Muséum*, classes the horizontal form among *les tailles hétéroclites*, and says, that, in consequence of its invariably producing a *tête de saule*, that is, a hedge of young shoots at the top, it has been long since abandoned. From this remark, we cannot help drawing the conclusion, that in France, the theory of training must be in advance of the practice.

Fig. 4.



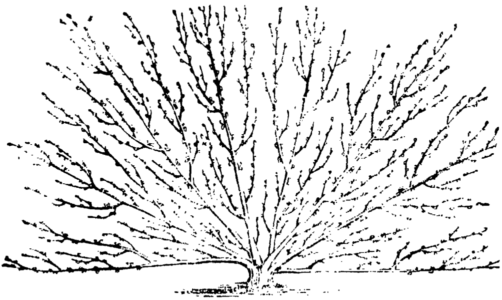
The other principal form is called *fan*-training. In this there is no leading stem, and the branches are arranged somewhat like the spokes of a fan. Fig. 5 represents this shape as it commonly occurs in gardens.

Fig. 5.



In the case of apple and pear trees, this mode, though frequently adopted, is not superior, perhaps not even equal, to the horizontal configuration: it is evident, that when the branches reach the top of the wall, where they must be cut short, a *tête de saule* is inevitable. It would be better to adopt a modification of the fan shape used for stone fruits (fig. 6); to establish a certain number of mother branches, and on these to form a series of subordinate members, chiefly composed of bearing wood.

Fig. 6.



The mother branches or limbs should not be numerous, but well marked, equal in strength, and regularly disposed. The side branches should be pretty abundant, short, and not so vigorous as to rival the leading members. To insure regularity, training should commence with maiden plants, or such as have only one year's growth from the graft; leaders of equal strength should be selected, and encouraged to grow out longitudinally as much as possible, and all crowding among the inferior shoots should be prevented. In *riders* this form passes into the stellar arrangement. The French have made considerable improvements in this mode of training, some of which will be noticed under the article Peach.

Intermediate between horizontal and fan training, is the *half-fan*, described in the first volume of the Caledonian Horticultural Society's Memoirs, by Mr Smith, gardener at Hopetoun House, and practised by him with great success. It is nearly allied to the horizontal form, but the branches form an acute angle with the stem, and this disposition is supposed to favour the equal distribution of the sap. In the winter pruning, three and sometimes four central branches are cut back; the shoots which arise from these are arranged in the fan order, and, as they elongate, are gradually brought into the horizontal position. The tree is finished at top as in the horizontal form. Sometimes, as in fig. 7 (on the following page), two vertical stems are adopted. For vigorous trees, this figure seems to combine the advantages of both the foregoing.

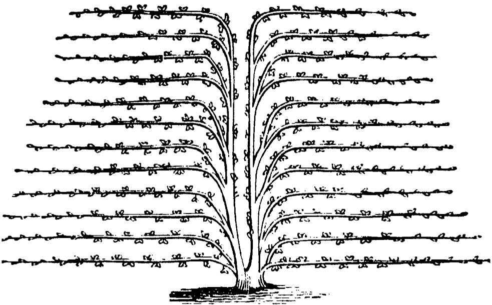


Fig. 7.

The choice of particular modes of training is too often determined by mere fashionable prejudice, which leads to the application of the same form to all sorts of trees. Thus the French are apt to reduce every thing to the *fan* system, while some English horticulturists are inclined to force trees of the most rambling growth into the pillory of a *horizontal* arrangement. Such a uniformity cannot possibly be in accordance with nature. The enlightened cultivator will employ various forms, and will determine for himself which is the most appropriate, not only for every species, but even for each particular variety of fruit-tree. By attentive observation and rational experiment, more knowledge in this department may be attained in a few years, than by a whole life spent in routine practice.

As supplementary to the preceding remarks on training, some of the expedients for inducing a state of fruitfulness in trees may be mentioned. Of these, the most common is root-pruning, or the cutting back of the roots to within three or four feet of the stem; an operation which is generally found efficacious, when barrenness proceeds from over-luxuriance and too copious a supply of sap. Another is, the lifting up of the roots carefully, spreading them out on the surface, and covering them with a layer of fresh soil, forming a slight mound, at the same time all naked or fibreless roots being cut out. To attain the same end, recourse is sometimes had to the somewhat questionable practice of *ringing* the branches or stem, that is, removing a narrow portion of the bark, so as to produce the appearance of an annular incision. The trees, it is said, are thereby not only rendered productive, but the quality of the fruit is at the same time apparently improved. The advantage is considered as depending on the obstruction given to the descent of the sap, and by it being thus more copiously afforded, in its elaborated state, for the supply of the buds. The ring should therefore be made in spring, and of such a width that the bark may remain separated for the season. It ought to be observed, however, that none of the stoned fruit-trees are benefited by ringing. Analogous to this practice is decortication, or the removing of the old cracked bark from the stems of apple and pear trees, a practice warmly recommended by the late Mr Lyon of Edinburgh, and some other cultivators, but which has never been extensively adopted. Sometimes barrenness proceeds from defect of climate and poverty of soil; in which case, a more sheltered situation and more generous treatment are the most effectual remedies. Fruit-trees should never, if possible, be allowed to become stunted; for in this state they produce only worthless fruit, and acquire a habit which scarcely admits of melioration.

PROTECTION OF BLOSSOM AND FRUIT.

In our variable climate, and particularly in the northern and eastern parts of the island, it is very desirable that the horticulturist should be provided with the means of defending the blossom of his fruit-trees from the late frosts in spring. For this purpose, some cultivators partially cover their walls with branches of spruce-fir or beech, or the fronds of the common *braken* fern (*Pteris aquilina*), fastened firmly by several points of attachment, to prevent rubbing. Others recommend frames covered with bunting, osnaburgh or similar light fabrics, set in a sloping position in front of the trees. Screens formed of reeds have been used; and nettings of worsted-yarn or of straw-ropes have been employed with good effect. Whatever contrivance serves to interrupt radiation, though it may not keep the temperature much above freezing, will be found sufficient. Standard fruit-trees must be left to their fate, and, indeed, from the lateness of their flowering, they are generally more injured by blight, and by drenching rains, which wash away the pollen of the flowers, than by the direct effects of cold. In not a few cases it is found very useful to promote the setting of blossom, by directly applying to it pollen from flowers of some other tree of the same species.

If the blossom requires to be guarded, equally so does the fruit, from the moment it begins to colour, till it be plucked for the table. Wasps and other insect enemies are often ensnared by means of phials half-filled with watery syrup, and hung upon the trees. Coverings of netting are employed to protect against the ravages of small birds: and this is preferable to shooting them; for among these feathered enemies it must be confessed with regret that not only the engaging Robin Redbreast but the melodious Blackbird fall to be numbered.

CULTURE OF HARDY FRUITS.

In proceeding to treat of the more special culture of the inmates of a British fruit garden, we shall begin with the more tender; but for details regarding these, reference may, to a considerable extent, be made to the Forcing department, in which alone many of the finer fruits can be perfected. The nomenclature of the numerous varieties of the principal fruits is still in an uncertain and unsatisfactory state. Mr Thompson, of the Horticultural Society's Garden at Chiswick, has, however, with much discrimination and judgment, settled the synonymes of many of those chiefly cultivated in our gardens; and we shall therefore (when the contrary is not intimated) adopt the names employed in the London Horticultural Society's Fruit Catalogue.

THE GRAPE.

The Grape Vine (*Vitis vinifera*) can scarcely be said to be a hardy fruit in our climate. In every case it requires a good aspect; and north of York, a crop of *dessert* grapes cannot be expected without the aid of a hot wall. In the extreme south-west districts of England, indeed, grapes fit for the manufacture of wine, perhaps equal in quality to those in the north of France, might be produced on dwarf standards; and there is abundant historical evidence that productive vineyards once existed in that part of the country.

In the London Horticultural Society's Catalogue, 182 varieties of grapes are enumerated. Some of those, however, have not as yet been well ascertained; some are pronounced indifferent, and others worthless. We shall name only a few of those most deserving the attention of the cultivator.

Miller's Burgundy. This sort is distinguished by the hoary pubescence of its leaves. It is a black grape, with short compact clusters, small round berries, and clear, high-flavoured juice. It is hardy, ripening completely on a south wall.

Black Damascus. Bunches large, with round berries and exquisitely sweet juice. This late variety does not set well, and the bunches are improved by the blossom being dusted with the pollen of some hardy kind.

Frankenthal. A valuable grape, very nearly allied to the Black Hamburgh. Bunches moderate in size, berries obovate, flavour excellent. Although this is the kind which is commonly trained against the open wall in Holland, it seems to require a warm vinery in Scotland.

Frontignan (or Frontignac). Several varieties under this appellation, and distinguished by the names of *black* (or purple Constantia), *grizzly*, *red*, and the *white*, are mentioned by horticultural writers. They vary in colour and form of the cluster. The berries are round, the skin thick, and the juice of a rich muscat flavour. They are all of high excellence. The white (often called white Constantia) is the earliest.

Black Gibraltar (Red Hamburgh of Lindley). This is an excellent grape, with large clusters, and large dark-red berries, full of a sweet juice.

Black Hamburgh. This is a well-known grape, of great value, and perhaps more generally cultivated for the dessert in this country than any other sort. It ought to be in every collection.

Wilmot's New Hamburgh, with remarkably large berries, very firm in flesh; but the bunches small and loose, and not shouldered.

Black Lombardy (or West's St Peter's). Bunches large, berries round, skin thin, with a sweet flavour; an excellent late sort. The fruit will hang on the vines till March.

Royal Muscadine (White Muscadine of Lindley and Usual Chasselas of Paris). This, though not a first-rate grape, comes early, and is a favourite with many. Bunches large, berries white, round, with rich and sweet juice.

Muscat of Alexandria. Bunches long, and also broad-shouldered, berries white and oval, but yellow when ripe and in perfection, with a delicious, very rich, muscat flavour; wood reddish-brown; leaf large and pendulous. This most admirable variety requires a high temperature, and should properly have a small vinery for itself.

The Canonhall Muscat is a variety of the former; similar in general appearance, but with larger leaves: cluster setting thinner and more irregularly, berries rather longer and larger, flesh less firm, but rich flavoured, and ripening fully a fortnight earlier.

Pitmaston White Cluster. This excellent variety sprang from a seed of the Small Black Cluster grape.

The bunch is compact; the berry is round, when ripe of an amber colour, bronzed with russet on one side. It comes to perfection on the open wall in England, and is well suited for forcing.

White Tokay. The bunch is small, and not shouldered; the berries of a rich vinous flavour; wood white; leaf stiff and downy.

Large White Sweetwater. Bunch loose, berries round, flavour sweet. It ripens early, generally from the middle to the end of September; and in the south of England it succeeds against the open wall. The bunches should be allowed to hang until they be perfectly ripe, when the berries acquire a slight russet colour. It has long been a favourite grape.

The Grove-End Sweetwater is an excellent early variety, and of good quality; the berries have a rich vinous flavour. It is the better for artificial impregnation.

Stillward's Sweetwater, or *Chasselas précoce*, is a recent variety, of considerable merit. It is desirable for earliness, and the bunches possess the property of keeping good on the plant for two or three months after the berries are ripe.

Black Morillon, or *Burgundy Grape*, or *Small Black Cluster*, ripens in England against a south wall.

The *Black Prince* is of easy cultivation, and the berries are of a pleasant flavour.

The *Zante*, or *Corinth Grape*, is often called Zante Currant. It is scarcely worth planting, as, in general, it is a shy bearer, and the berries small; but Mr Gow, gardener at Tulliallan, having fertilized some bunches with the pollen of the Black Hamburgh, found that they set more freely, and that the berries were larger and better flavoured; a hint worth attending to in other cases.

The *Verdelho* has loose bunches, berries of a greenish-yellow colour, small, oval, numerous; when fully ripe, of a rich saccharine flavour. It is the principal grape cultivated in Madeira for making the celebrated wine of that island. The plant grows vigorously; and the late Mr Knight has observed of it, that the same degree of shade which would render the greater number of sorts wholly unproductive, scarcely affects the fertility of this; a convenient property, which adapts it for the back wall of a glazed house. The same horticulturist mentions another economical property of the *Verdelho*: it bears plentifully when planted in very small pots. A few pots of it may therefore be introduced among greenhouse plants in early spring; the almost leafless stems do no injury till the end of May, when some of the more hardy ornamental plants can be set abroad; and during the warm months which follow, when the greenhouse is otherwise empty, abundant crops of these small grapes may be procured.

The *Esperione*, or *Turner's Early Black*, has the bunches large and shouldered, not unlike those of the Black Hamburgh. The berries are of a fine dark colour, with a bluish farina or bloom; the pulp adheres to the skin; and though neither highly flavoured nor melting, it is very pleasant. This grape ripens on the open wall near London.

The *Syrian Grape* is remarkable only for the extraordinary size and beauty of its bunches; it is a late variety, and the berries are sweet and not without flavour, when properly ripened; but, in general, it is a worthless variety. This is generally regarded as the kind produced in the valley of Eshcol, a cluster of which was brought to the camp of Israel, swung on a staff between two of the spies; not probably on account of its weight, but (as Dr Clark observes) to prevent the berries from being bruised.

In addition to the above, the editor of the *Lond. Hort. Cat.* mentions the following as excellent grapes:—Ciotat. or Parsley-leaved; Genuine Tokay, or White Morillon; Chasselas musqué, an early sort with a rich musky flavour; Elford; Lunel; Mignonne White Cluster; Black Morocco, requiring a strong heat to cause it to set; Black Muscadine; Petersburgh; Raisin des Carmes; and Black Tripoli.

For an ordinary vinery the following may be recommended: Black Hamburgh, Welbeck, Black Tripoli, Royal Muscadine, White Frontignan, and Black Lombardy. For a stove or late vinery may be particularized the Welbeck, Grizzly Frontignan, Black Tripoli, Muscat of Alexandria, and Canonhall Muscat. For training against the rafters of a greenhouse, the Black Prince, Verdelho, Esperione, and Black Cluster, are perhaps among the best.

The kinds commonly grown against the open wall in England are the Miller Burgundy, Esperione, White Muscadine, White Sweetwater, Early Black, Grove-End, and Pitmaston White Cluster. In the north of England, and in the south of Scotland, vines always require hot walls. Against a hot wall, at Erskine House, on the Clyde, Black Hamburgh grapes are every year produced equal in size and flavour to those of the vinery or hothouse. In some gardens, an entire wall is dedicated to vines, but, in general, they occupy only the interstices between other trees. Mr Williams of Pitmaston trained a vine under the coping of a wall to the extent of fifty feet, and bent down the shoots at intervals to fill up the spaces between the fruit-trees; and he found that the grapes were better the farther they were distant from the main stem and root. The culture of grapes on a wall does not differ materially from that practised in a moderately worked vinery; we shall therefore defer any further observations till we resume the subject in treating of the Forcing department.

Mr Mearns has of late recommended the culture of grape-vines in flower-pots, by coiling the lower part of the stems in the pots. When the plants can be subjected to a pretty high temperature, with bottom-heat, some fine bunches may thus be procured from a very small stove, without materially interfering with ornamental exotics kept in the same place. Mr Shearer, the gardener at Yester House, is a very successful cultivator of the vine and other fruits in pots.

The Fig-Tree (*Ficus Carica*) is not a great favourite in this country, the fresh fruit not being much relished, and our tables being supplied with a vast abundance of dried figs imported from the Mediterranean countries. Every good garden ought, however, to contain a few trees, to furnish an occasional dish; and we doubt not that the fresh fruit, if it were more common and better grown, would be more liked. The foliage of the tree is large and elegant, and the mode of fructification is curious: the pulpy part, which we call the fruit, being, in fact, a common receptacle, and the anthers and stigmata being produced inside. The nomenclature of figs is still very uncertain, and it is with some hesitation that we give the following names :—

1. Black Ischia.
2. Black Genoa.
3. Brunswick or Madonna.
4. Brown Ischia or Miller's chestnut fig.
5. Brown Turkey.
6. Pregussata.
7. Lee's Perpetual.
8. Early White.
9. Marseilles or Figue blanche.

Of these, the Marseilles, the Early White, Black Ischia, and Brown Turkey, are the best adapted for forcing ; the others are suitable for walls. Lee's Perpetual answers well for either mode of culture ; but is not recognized by Loudon or by Lindley as a distinct variety.

Fig-trees may be propagated by cuttings put into flower-pots, and placed in a gentle hotbed. They are, however, most speedily obtained from layers. The shoots laid down should be two or three years old ; and these, when rooted, will form plants ready to bear fruit the first or second year after planting. Suckers ought never to be used.

In some places in England fig-trees are planted out as standards ; and in Kent and Sussex, a few small fig orchards exist. In Scotland a south wall is indispensable, trained to which, in good situations, and when the trees are old enough, they bear remarkably well. The best soil for a fig border is a rich friable loam, on a subsoil not retentive of moisture, or which has been effectually drained. It is advantageous to have a lofty wall, and the trees should be planted at considerable distances, perhaps not nearer than forty feet, to allow them full space to exhaust their luxuriance.

It is the nature of the fig-tree to produce two sets of shoots, and two crops of fruit in the season. The first shoots generally shew young figs in July and August, but these in our climate very seldom ripen. The late or midsummer shoots likewise put forth fruit-buds, which, however, do not develop themselves till the following spring, and then form the only crop of figs on which we can depend in this country.

Various modes of training fig-trees have been proposed. Lindley recommends the horizontal form. The late Mr Knight carried up a central stem perpendicularly to the top of the wall, and then radiated the side-branches horizontally and pendently, in close contact with the wall. Luxuriance of growth is supposed thus to be checked, and the branches thrown into a bearing habit. The finest fig-trees which we have seen in Scotland, are trained in the old fan form. The shoots are laid in, thinly, at full length, and encouraged to extend themselves as fast as possible; precaution, however, being taken to leave no part of the tree bare of young wood. Much of the pruning is performed in summer by pinching off unnecessary shoots, and the knife is seldom employed, except in removing naked branches, or in cutting back to procure a supply of young wood. Some cultivators break off the points of the spring shoots, in order to produce laterals, but this must be done at an early period, not later perhaps than midsummer, otherwise the young shoots will not ripen. The Rev. G. Swayne recommends rubbing off all the young figs which appear in autumn on shoots of the same year; observing, that for every young fig thus displaced, the rudiments of one, or perhaps two others, are formed before winter, and developed in the following year.

The winter dressing of the fig-tree takes place immediately after the fall of the leaf. The immature figs which may remain are removed, irregularities are corrected, and the shoots nailed neatly to the wall. Various modes of protecting the branches during winter have been adopted. At Argenteuil, where figs are cultivated on standards for the Paris market, the lower branches are bent downwards, and buried about six inches deep in the soil; while the upper branches are tied together, and bound round with straw and litter. Mr Swayne mentions that he wraps up the young shoots with waste paper. Mr Forsyth recommends covering wall fig-trees with the spray of laurel or yew, and then tucking in short grass or moss (*hypnum*) among the spray. The late Mr Smith, gardener at Hopetoun House, found (*Cal. Hort. Soc. Mem.*, vol. ii.) a covering of spruce-fir branches to be very effectual. The branches are so placed as to overlap each other, and to form a layer nearly equally thick on every part of the tree. The foliage of the spruce branches remains green till March, and as the light and heat increase, the dried leaves gradually fall off, and admit air and sun to the fig branches below.

Mr Monk (*Lond. Hort. Trans.*, vol. v.) states, that the same fig-tree seldom produces fruit containing both perfect stamens and pistils, and conjectures that this is the cause of the fruit being so often prematurely shed. *Caprification*, or assisting the fructifying and maturation of figs, has often been sneered at; but here we see reason in that kind of it which consisted in hanging or shaking the branches of the wild fig (*caprificus*) over the cultivated tree at the time when both were in blossom.

THE PEACH AND NECTARINE.

The Peach (*Amygdalus Persica*) is a stone-fruit of oriental origin, said to have been brought from Persia by the Romans, about the beginning of the empire; but the precise period of its introduction into our British gardens, of which it has long been the pride and ornament, is not well ascertained. There are two principal varieties: the Peach, properly so called, with a downy skin; and the Nectarine, with a smooth skin. These, following the authority of Linnæus, we consider as one species; and as their culture is precisely the same, we shall speak of them as distinct only when referring to their sub-varieties. Each of these varieties is again divided by gardeners into *freestones* or *pêches* and *clingstones* or *pavies*, according as the stone parts freely from the pulp, or adheres to it. We shall here treat chiefly of the freestones, as being most hardy, and fittest for the open wall in Britain.

Mr George Lindley, whose arrangement is the best that has hitherto been published, enumerates 60 kinds of peaches, and 28 of nectarines. In the Horticultural Society's Catalogue, the names of 183 peaches, and of 65 nectarines, are recorded. We doubt not but that in America, where the trees are commonly raised from kernels, and grown as standards, endless varieties and sub-varieties might be collected. To enumerate even the limited number existing in Britain would far exceed our limits; we shall, therefore, notice only a few of those which are most distinct, and best adapted to our climate.

PEACHES.

Red Nutmeg, or *Avant rouge*. This is one of the earliest peaches, ripening about the beginning of August. The fruit small; colour pale yellow towards the wall, bright vermilion next the sun; pulp white, but red at the core: the juice rich and musky. The tree is an abundant bearer.

Acton Scot. This was raised by Knight between the Noblesse and the Nutmeg peach, in 1814. The fruit is red next the sun, and white on the other side, ripening in August; the pulp rich, juicy, and saccharine; the tree is a good bearer, and not apt to be affected with mildew.

Spring-Grove. This is another of Knight's peaches, raised from the Grosse Mignonne crossed with the pollen of the Nutmeg. It is dark red on one side, and bright yellow on the other; pulp firm, but melting, and of excellent flavour. The tree is a good bearer, especially when on an apricot stock. The fruit ripens in the beginning of September.

Grosse Mignonne. Fruit large; skin pale yellow, and deep purple next the sun; flesh melting; juice plentiful, and of delicious flavour. The tree is a good bearer, and forces well, but the fruit does not bear carriage. It ripens in the end of August and beginning of September.

Madeleine de Courson (Red Magdalen of Miller) Blossom large; fruit rather below the middle size; colour yellowish-white next the wall, beautiful red next the sun; flesh white, with very little red at the stone; juice rich and vinous. Tree a good bearer; fruit ripening about the beginning of September. "An excellent peach," says Mr Lindley; "and ought to be found in every collection."

Royal George. This is a well-known peach, much cultivated. By nurserymen it is often given out under the name of Red Magdalen; but the blossoms are small, while those of the Magdalen are large. Against a good wall the fruit often ripens in the beginning of September, and even in indifferent seasons by the middle of that month. Fruit large, purplish-red next the sun. whitish where shaded; flesh white, varied with red next the stone, which is free; melting, rich, with an abundant sugary juice. It is also one of the best kinds for a peach-house, fruiting freely, and ripening well. The foliage is, however, rather subject to mildew.

Noblesse. This has long and deservedly been a favourite in our gardens. It is a very large fruit; the skin pale, red when ripe; the flesh juicy and rich. The tree is a good bearer, and the fruit ripens in September.

Bellegarde (the Galande of the nurseries). Fruit large and globular; skin deep red, with purple streaks on the sunny side; flesh pale yellow, very melting; juice rich. An excellent peach; the tree forces well, and the fruit ripens on the open wall about the middle of September.

Barrington (sometimes called *Buckingham Mignonne*), is a handsome fruit, rather large, of a pale yellowish-green next the wall, but deep red next the sun; flesh melting, juicy, and very rich, yellowish-white, slightly rayed with crimson next the stone; ripens about the middle of September. The tree bears forcing well, and is not subject to mildew.

Late Admirable, or *La Royale.* Fruit large; skin pale green next the wall, pale red on the sunny side; flesh greenish-white, red at the stone; juice abundant, and, when well ripened, of a high flavour. "One of the very best late peaches," says Mr Thomson, "and ought to be in every collection." It is very proper for the peach-house, to succeed the earlier sorts.

Nearly allied to the preceding is the *Teton de Venus*, a beautiful fruit, but requiring a warm situation. In a good season it ripens at the end of September; is saccharine, and at the same time of fine flavour.

George the Fourth. This is a fine large peach of American origin; bears forcing well, and is a semi-clingstone. It requires a flued wall in this country.

Among other excellent peaches may be mentioned: *Freestones*—Chancellor, Knight's Early, Downton Early, Malta or Belle de Paris, Royal Charlotte, and William's Early Purple; *Clingstones*—Catherine, Heath, and Old Newington.

NECTARINES.

Fairchild's Early. A beautiful little freestone; chiefly, however, cultivated for its earliness. It ripens about the middle of August.

Elruge is an excellent fruit, of a moderate size; flesh white, almost to the stone, which is free. The tree forces well, and is a good bearer. Fruit ripens about the beginning of September.

Hunt's Tawny. Size moderate; skin pale orange next the wall, russet-red towards the sun; flesh deep orange, juicy and well-flavoured; a freestone. A very distinct sort, worthy of cultivation for its earliness.

Early Newington. A fine large clingstone; pale green on the shaded side, bright red next the sun; juice saccharine and well-flavoured. Ripens in August.

Red Roman. An excellent old clingstone, now seldom to be met with genuine, but worthy of re-introduction.

A few other first-rate nectarines may be enumerated: *Freestones*—Brinion, Downton, Murrey (*i. e.*, murrey-coloured), Pitmaston Orange, Violette grosse, Violette hâtive, Duc de Tello; *Clingstones*—Imperatrice, Newington Tawny. A very good nectarine was raised by the late Mr Henderson at Woodhall in Scotland. It approaches the Elruge. The fruit is early, and of excellent flavour, and the tree bears plentifully. It has been named the *Woodhall Nectarine.*

If requested to recommend peaches and nectarines for a small glazed house, and for the wall of a middle-sized garden, the following would be our selection. For the peach-house: Royal George, Barrington, Noblesse, Bellegarde, Grosse Mignonne, Early Purple peaches; Violette hâtive, Hunt's Tawny, Elruge, and Roman nectarines. For the wall: Royal George, Late Admirable, Noblesse, Malta, Grosse Mignonne, Barrington, Bellegarde, George the Fourth, and Spring-Grove peaches; Early Newington, Hunt's Tawny, Violette hâtive, Fairchild's Early, Roman and Pitmaston Orange nectarines.

For information respecting the best modes of raising new varieties of peaches and nectarines, the reader may be referred to Mr Knight's papers in the first volume of the Transactions of the Horticultural Society of London. That ardent horticulturist entertained the hope, that, by repeated sowings, the peach might acquire so robust a habit as to be capable of succeeding as a standard in favourable situations in England and Ireland. But with this desirable object in view, we would rather see the number of the kinds diminished than increased; and it would be well for the country, were all the indifferent sorts banished from the nursery catalogues.

To perpetuate and multiply valuable varieties, peaches and nectarines are budded upon plum or almond stocks. For dry situations, almond stocks are preferable; and for damp or clayey loams, it is better to use plums. An almond budded on a plum stock may be rebudded with a tender peach, greatly to the advantage of the latter. The peach border should be composed of a light mellow loam, such as is suitable for the vine and the fig, put in as rough as possible, or not broken small and fine. It should be well drained, or rendered quite free from all stagnant water, or latent dampness. It need not be of great depth, perhaps eighteen inches; for the peach-tree thrives best, and is most productive, when the roots are near the surface of the ground. We believe that in many instances, all that is required to remedy sickly and unfruitful trees is to bring up their roots within five or six inches of the surface. In this country nothing is a greater obstacle to success in peach culture than trenching the borders, and cropping them heavily with culinary vegetables.

The fruit of the peach is produced on the twiggy shoots of the preceding year. If these be too luxuriant they yield nothing but leaves; and if too weak, they are incapable of maturing the fruit. To furnish these, then, in sufficient abundance, and of requisite strength, is the great object of peach training and pruning. All twiggy trees naturally fall into the fan form ; and, accordingly, this has generally been adopted in the culture of peaches.

We shall first, therefore, notice the old English method, and then briefly the French, and other new modes of training.

The *old fan* form is very nearly that already given (fig. 5) as a specimen of fan training for twiggy trees. The young tree is often procured when it has been trained for two or three years in the nursery; but it is generally better to commence with a *maiden* plant, that is, in the first year after it has been budded. It is then headed down to five or six buds, and in the following summer two to four shoots, according to the vigour of the plant, are trained in; the laterals also being thinned out, and properly nailed to the walls. Suppose there be four branches : in the subsequent winter the two central ones are shortened back to produce others, and the inferior ones are laid in nearly at full length. In the following season additional shoots are sent forth ; and the process is repeated till eight or ten principal limbs or *mother branches* are obtained, forming, as it were, the framework of the future tree. These mother branches are occasionally raised or depressed, so as to mantain their equilibrium, and are as much encouraged to grow outwards as is consistent with the regular filling up of the tree. The laterals are carefully thinned out (by pinching off with the fingers) in summer, and the remainder are nailed in, to afford subordinate members and bearing wood. When the centre of the tree has been filled up, all the training necessary is merely to prevent the inferior members from acquiring an undue ascendancy over the mother branches. It is highly advantageous to have abundant space, and to draw the tree outwards, so that it be thin, but nowhere destitute of young shoots.

Meanwhile the pruning for fruit has been going on. This consists in shortening down the laterals which had been nailed in at the disbudding, or summer pruning. Their length will depend on their individual vigour, and the luxuriance of the tree. The buds, which are generally double, or rather two together, with a fruit bud between them, seldom occur quite close to the insertion of the shoot. Perhaps two or three pairs are left with a wood bud at the point to afford a growing shoot, in order to act as its lungs; for it is necessary that there should be leaves above the fruit. The extent of thinning of the fruit must depend on the vigour of the tree; a pair of fruit to each square foot of wall being an average allowance. When the fruit begins to swell, the point of this leading shoot is pinched off, that it may not drain away the sap. Any young shoot from the wood-eyes at the base of the bearing branch is carefully preserved, and in the following winter it takes the place of the branch which has borne fruit, and is cut out. If there be no young shoot below, and the bearing branch is short, the shoots at the point of the latter are pruned for fruit; but this must be done cautiously; and if the bearing branch be long, it is better to cut it back for young wood. It is the neglect of this which constitutes the principle error of the English fan system as it is usually practised. Several times during summer the trees are regularly examined; the young shoots are respectively topped and thinned out; those that remain are nailed to the wall, or braced in with pieces of peeled willow, and the whole trees are occasionally washed with the force-pump.

The *Montreuil form* (fig. 8) is described at length in the

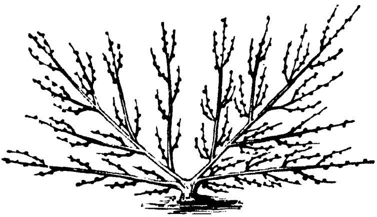


Fig. 8.

Horticultural Tour, p. 249, or in the *Cal. Hort. Mem.*, vol. iv., p. 145. The principal feature constitutes the great principle of all French training, the suppression of the direct channel of the sap. Four, more commonly two, *mére branches* are so laid to the wall that the central angle contains about 90°. The other branches are all treated as subordinate members. This form is open to the objection, that if the under branch should die, the upper one cannot be brought down into its place.

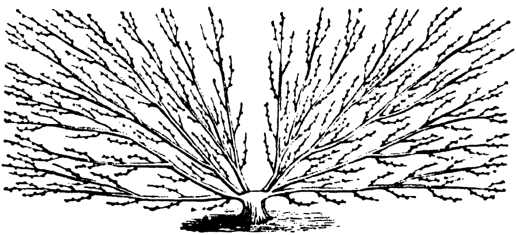


Fig. 9.

The form *à la Dumoutier* (fig. 9, so called from its inventor, and described at great length by Lelieur) is merely a refinement on the Montrueil method, and is unquestionably the best form for peaches, apricots, plums, and cherries. It will be sufficient to mention to the experienced trainer (and none other can be expected to execute this form), that the formation of the tree commences with the inferior limbs, and proceeds towards the centre, the branches being lowered from time to time, as the tree acquires strength. What is most worthy of notice in this method, is the management of the subordinates in the pruning for fruit. When a shoot promises blossom, it is generally at some distance from the point of insertion into the old wood, and the intermediate space is covered with wood-buds. All the latter, therefore, which are between the old wood *a* and the blossom *c* (fig. 10), except the lowest *b*, are carefully removed by *ebourgeonnement* or disbudding. This never fails to produce a shoot, *b* (fig. 11), the growth of which is favoured by destroying the useless spray above the blossoms, and pinching off the points of those which are necessary to perfect the fruit. A replacing shoot is thus obtained, to which the whole is invariably shortened at the end of the year. The branch thus treated is called the *branche de reserve*.

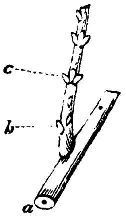


Fig. 10.

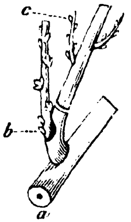


Fig. 11.

The form *à la Sieule* (fig. 12) is another modification of the Montrueil training, for an account of which we must again refer to the Horticultural Tour. This figure will give an idea of the general arrangement of the tree. The

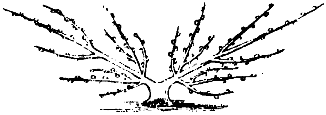


Fig. 12.

two mother branches are laid in very obliquely, and are never shortened. On the subordinate branches three buds only are left, at the winter pruning, one terminal, and two at a considerable distance from each other on the sides of the shoot. This method has nothing to recommend it.

Mr Seymour's form (fig. 13, as described in vols. i. and ii. of the Gardener's Magazine) approaches more nearly to the French methods than any other practised in this country. It will be seen, however, from the annexed

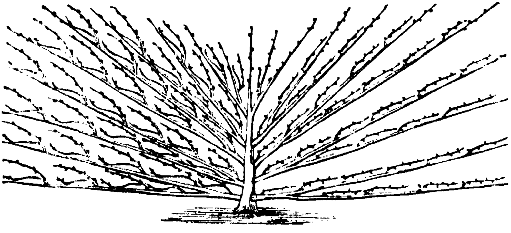


Fig. 13.

figure, that he does not suppress the direct channel of the sap. This circumstance, although considerable stress seems to be laid upon it, is not essential to the plan, nor is, perhaps, the best part of it. The principal novelty is, that the bearing shoots are all on the upper sides of the mother branches, and that these bearing shoots are wholly reproduced once a-year. The one side of this figure represents the tree *after* the winter pruning, the other side before it has undergone that operation. It will be observed, that on this last side there are pairs of shoots on the upper parts of the mother branches. The lower shoot, that, namely, which has borne fruit, is cut out, and the other is brought down into its place. This replacing shoot is shortened to about eight or nine inches, care being taken to cut at a wood-bud; and at the time of disbudding, the best situate buds, and those nearest the base, are left for the future year's bearing. To this plan it is objected, by a writer in the Horticultural Register, that the annual excision of the bearing shoots produces a series of rugged and unsightly protuberances at their base, and along the upper surface of the principal members; an objection which also militates against Dumoutier's form (fig. 9). Loudon however declares that Seymour's mode is the most perfect in theory that has been described. For ourselves, we are inclined to prefer the old fan-form, when well executed, as approaching nearest to the natural habit of the tree, and as best adapted to our uncertain climate. As a general observation, it may be said, that, in the training of peach-trees, "whatever is best administered is best;" and there is no doubt that many ingenious gardeners have only partial success, because, from the multiplicity of their engagements, their trees can receive only partial attention.

For cold and late situations, Knight recommended the encouraging of spurs on the young wood; such spurs, when close to the wall, being found to generate the best organized and most vigorous blossoms, and thus to insure a crop of fruit. They may be produced, by taking care during the summer-pruning, or disbudding, to preserve a number of the little shoots emitted by the yearly wood, only pinching off the minute succulent points. On the spurs thus procured, numerous blossom-buds form early in the following season. This mode of spurring is much practised in Scotland.

Peach-trees, particularly in the north of England, and also in Scotland, require protection from atmospherical influences, especially at the period of blossoming. As already noticed, branches of spruce or silver fir, or other spray, are sometimes woven into frames, which are fixed in front of the trees, and removed during the day, in fine weather (*Cal. Hort. Mem.*, i., 276). Canvas or bunting screens are equally effectual, and perhaps more easily moveable. Straw-ropes, straw-nets, and a variety of other expedients, have been proposed, and may be used according to circumstances. If the screens be applied early in the season, great benefit may be derived from retarding the blossom till the frosty nights of spring be past. If the night frost have been severe, a copious sprinkling of water over the whole tree, before the influence of the morning sun is felt, has been found to be very useful in gradually raising the temperature of the foliage and blossoms, and thus preventing injury from the sudden transition. To trees trained against hot walls, if fire be used in spring, screens are indispensable ; but perhaps hot walls are most beneficially employed in ripening off the fruit of the late sorts of peaches in autumn ; and, what is equally important, ripening the young wood of such sorts.

When peach and nectarine trees are liable to mildew and to aphides, it is found very useful to coat, with a painter's coarse brush, all the branches and twigs with a compost of black soap and flowers of sulphur, mixed with water, and boiled to the consistence of paint. This should be done during winter, and while the trees are unnailed from the wall.

The late pruning of the peach and nectarine should take place early in the winter, and not be delayed till the spring, as is sometimes the case.

THE ALMOND.

The Almond-Tree (*Amygdalus communis*), a native of China, may be noticed here rather on account of its affinity to the peach and apricot, than because of its importance as a fruit-tree in this country. Every good garden should contain a tree or two trained against a west or east wall, and also a few standards; for in very fine seasons the latter will yield crops, and they are always ornamental in spring from the beauty of their blossoms. The sorts most worthy of notice are:—the Tender-shelled Sweet Almond or Jordan, and the Commond Almond or Bitter.

The Almond is generally budded on seedlings of its own kind; but for heavy soils, plum-stocks are preferable. The training and pruning of almond-trees on walls are much the same as in the peach or the apricot.

THE APRICOT.

The Apricot (*Prunus Armeniaca*) is a native of the Caucasus and China; it was cultivated by the Romans, and was introduced into England from Italy in the reign of Henry VIII. It has always, and deservedly, been a favourite. The principal varieties are the following:

Red Masculine. Flowers small; fruit small, roundish, yellow and red; flesh sweet and juicy; stone impervious; kernel bitter. This is a very early sort, but the tree is rather tender, and requires a good aspect.

Breda. Flowers large; fruit roundish, sometimes almost four-cornered, orange-coloured; juice rich, stone small, impervious; kernel sweet. The true Breda is an apricot of first-rate excellence, and in the south of England the tree bears well as a standard.

Roman. Flowers large; fruit oblong, compressed, pale yellow; flesh soft; stone impervious; kernel very bitter. The tree is a good bearer, but the fruit is fit only for preserving. It is sometimes called the Brussels,—a name also occasionally given to the preceding.

Moorpark. Flowers large; fruit roundish, compressed, orange and red; flesh parting from the stone, juicy and rich; stone pervious; kernel bitter. This is generally considered the best apricot in this country. There are several sub-varieties known under different names; and among these Shipley's is the best. It scarcely differs from the *Apricot Peche* of the French.

Hemskirke. Like a small Moorpark, but with a more tender and juicy pulp, and with the rich flavour of a green-gage plum; kernel small, sweetish. A desirable early fruit, ripening on an east wall in the end of July or beginning of August.

Turkey. Flowers large; fruit middle-sized, spherical, deep yellow; flesh juicy and rich, parting from the stone, which is impervious; kernel sweet. This is an excellent late variety.

Besides these we may mention the Large Early, the

White Masculine, Musch-musch, and Royal. The last is a French variety of recent origin; it is excellent, and ripens earlier than the Moorpark.

Apricots are propagated by budding on muscle or common plum-stocks. Mr Knight recommends the wilding apricot as a stock for the Moorpark variety. Some gardeners have adopted the horizontal form of training, but the most usual, and certainly the best, is the common fan arrangement; for the taller the tree, the greater the produce of fruit. The fruit is produced on shoots of the preceding year, and on small close spurs formed on the two-year-old wood. The apricot is a tree of much stronger growth than the peach, and therefore requires more room: this and the peculiarity of the spurs being kept in mind, the observations made on the training and pruning of the peach may be readily applied to this tree. It requires a summer and winter pruning. The former should begin early in June, at which period all irregular fore-right and useless shoots are to be pinched off; and, shortly afterwards, those which remain are to be fastened to the wall, to become bearers. At the winter pruning, all wornout branches, and such as are not duly furnished with spurs and fruit-buds, are removed. The young bearers are moderately pruned at the points; care, however, being taken to leave a terminal shoot or leader to each branch. The most common error in the pruning of apricots, is laying in the bearing shoots too thickly.

The blossom comes early in spring, but is more hardy than that of the peach: the same means of protection, when necessary, may be employed. The fruit often sets too numerously; and in this case it is thinned out in

June and in the beginning of July, the later thinnings being used for tarts, for which purpose they are in much request. In the south of England, apricots are sometimes trained against espalier-rails, and occasionally planted as dwarf standards ; and it is said that in good seasons the fruit from such trees is more highly flavoured than that from walls. In general, however, the protection of a wall is required. An east or west aspect is preferred in England, the full south being apt to induce mealiness of pulp. In Scotland the late varieties require the best aspect than can be afforded.

THE PLUM.

The Plum-Tree (*Prunus domestica*) is considered by Sir J. E. Smith as a native of England. Many of the best cultivated varieties, however, have been introduced from France. The Horticultural Society's Catalogue enumerates 274 sorts, though probably all of these are not well ascertained. We shall first notice a few of the best dessert plums, and then give a list of select kitchen sorts.

The *Green-Gage* is the *Reine Claude* of the French. Being a great favourite at Paris (as it is everywhere else), during the ferment of the first Revolution, when all allusions to royalty were proscribed, it retained its popularity under the title of Prune Citoyenne. It was introduced into England by the *Gage* family, and the foreign name having been lost, it obtained its present appellation. It is a fruit of first-rate excellence, the flavour being exquisite. The tree deserves a place against an east or west wall, where the fruit acquires a larger size without materially falling off in richness of flavour.

Treated as a wall tree, it seldom bears well till it is old, and it is very impatient of exact training, as indeed most plums are. In warm situations it may be properly grown on an espalier-rail, or as a dwarf standard.

The *Drap d'Or* is a small yellow plum of high flavour, ripening in the beginning of September. On a light soil the tree is a tolerable bearer; but on a heavy soil it seldom succeeds. The fruit precedes the Green-gage in ripening, and resembles it in quality.

Coe's Golden Drop is a fine large oval plum; excellent either for the table or for preserving. It keeps well; and Mr Lindley informs us, that he has eaten it exceedingly good twelve months after it had been gathered. It requires the best aspect of a wall; and will scarcely answer in a bleak climate.

For standards, *Gisborne's Early Plum* is one of the best and most productive that can be recommended, particularly for the northern portion of Britain.

The same may be said of the *Coul Orleans*, a plum raised by that distinguished horticulturist, Sir George Stuart Mackenzie of Coul.

The *Precoce de Tours* is an early sort; of a dark blue colour, with a violet bloom; pulp yellow, and of a very pleasant flavour. The tree succeeds as a standard.

The *Blue Imperatrice* is a fine late plum; the tree is a good bearer, but requires an east or west wall.

Reine Claude Violette. A very high-flavoured variety, resembling, colour excepted, the Green-gage. It succeeds on standards, but is improved by a wall. The tree is a good bearer.

Washington. Fruit rather large, roundish oval, pale yellow on the shaded side, and of a fine glaucous light purple on the exposed side; of excellent quality, little inferior to the green-gage. The tree is vigorous, and bears well against a wall, the fruit ripening about the middle of August. Being an early plum, it will, in favourable situations, succeed as a standard. It is, as the name imports, of American origin. It ought to be in every collection.

Couper's Large Red is a plum of large size, oval; suture deeply cleft on one side; skin of a bluish glaucous purple on the exposed side, on the other dull red; flesh firm, adhering to the stone; ripening in Scotland in the beginning of September on a south wall. Although this is only a fruit of second quality, yet the tree well merits a place, on account of its great productiveness.

The following may also be accounted first-rate plums, and deserving a place against the wall:—Coe's Late Red, Downton Imperatrice, Isleworth Imperatrice, Royal Hâtive, Kirke's Plum, Blue Perdrigon, White Perdrigon, Ickworth Imperatrice, Early Orleans, White Magnum Bonum, Mirabelle, Dunmore, Jefferson, Victoria, and Lawson's Golden Gage.

The Cheston, Fotheringham, Goliath, Wilmot's, Orleans, La Royale, Sharpe's Emperor, Morocco, and some of the Damsons, though generally regarded as only second-rate plums, deserve notice, and should always be introduced in large gardens, at least as standards. The Early Violet is an excellent bearer, and strongly recommended by Lindley to be planted in cottage gardens. Lucomb's Nonsuch plum should not be omitted; for when well ripened, it makes an approach to the green-gage in flavour.

As kitchen and preserving plums we may specify the common Damson, Shropshire Damson, Imperial Diadem, Isabella, White Magnum Bonum, Red Magnum Bonum or Imperiale; the Caledonia or Nectarine Plum, a large and handsome fruit; the St Catherine, Wine-sour, and Bullace.

The finer dessert plums are propagated chiefly by budding on Muscle or St Julian stocks. They are sometimes grafted, but gum is apt to break out at the place of junction. The Damson, Wine-sour, and other varieties, planted as standards, are generally increased by suckers, which the old plants afford plentifully. For placing against walls, trees which have been trained for two years in the nursery are to be preferred.

Plum-trees require ample space. On common walls they should be allowed from twenty to twenty-five feet of breadth over which to extend themselves. The horizontal mode of training is adopted by many. The fan form is also very commonly followed, and undoubtedly where there is room, it is the best. The shoots ought to be laid in at full length. The fruit is produced on small spurs, on branches at least two years old, and the same spurs continue fruitful for several years.

Standard plum-trees require only to have a portion of their wood thinned out occasionally while they are young. The hardy kinds grown in this way are very productive, and in some places in the north of England, their produce forms a considerable article of food for several weeks, and also an article of commerce, particularly the Wine-sour, which is in great request for preserves. It is matter of regret that this branch of fruit culture has not as yet met with due attention in Scotland.

THE CHERRY.

The Cherry-Tree (*Prunus Cerasus*) is said to have been introduced into Italy from Pontus in Asia, by the Roman general, Lucullus. From the "London cries" of Lydgate, it appears that "cherries in the ryse," or in twigs, were hawked in London at the beginning of the fifteenth century. Excellent sorts have at various times been introduced from the Continent, and, of late years, several first-rate new varieties have been raised in England. Geans included, the Horticultural Society's Catalogue enumerates no fewer than 219 varieties; the following may be accounted some of the best.

The *Early Purple Griotte* may be first mentioned, as being the earliest of all cherries, sometimes ripening in the end of May, and generally early in June. It is not yet generally known in this country, but deserves cultivation, the fruit being large, of a fine purple colour, and of rich flavour.

Knight's Early Black is a large, dark-coloured cherry, of excellent quality, ripening in the end of June.

The *May Duke* is one of the most common, and, at the same time, one of the most valuable cherries. In fine seasons, and on a good aspect of wall, it begins to colour in May; and in such situations it is generally ripe from the middle to the end of June. The tree also bears well as a dwarf standard, but against a wall the fruit gets larger, and does not fall off in flavour.

The *Royal Duke* is a rich sweet cherry, with most of the qualities of a May Duke. On a standard it ripens in August.

Bigarreau or *Graffion*. This is an excellent fruit, especially when it gets the protection of a wall. In the cherry orchards of England this sort is now pretty extensively cultivated, the fruit meeting with a ready sale, and vast quantities being required for the London market.

Harrison's Heart is nearly allied to the Bigarreau ; it is rather of larger size and of fine appearance in the dessert, but inferior in flavour. The fruit has the advantage of not being liable to crack in wet weather.

Belle de Choisy, an excellent cherry. The fruit come in pairs, red, mottled with amber colour, tender and sweet. The tree bears well as a standard.

Black Tartarian, or Ronald's Black Heart. Fruit large, obtuse heart-shaped ; flesh half tender. "The quality is good, and in appearance it is one of the finest." The tree is a good bearer, and well adapted for forcing.

Waterloo. Raised by a daughter of the late Mr Knight from the Bigarreau and May Duke. Fruit black, large, obtuse heart-shaped, pulp tender. It ripens in July, and the tree is a free bearer.

Elton. Raised by Knight from the Bigarreau and White Heart. Fruit large, heart-shaped, pale red, with a sweet delicious juice. The tree is a good bearer and hardy ; the fruit ripens shortly after the May Duke.

Kentish Cherry. One of the oldest and most prevalent cherries in England, abounding in the orchards of Kent. When ripe, it is of a full red colour, and its subacid flavour is very agreeable. It is commonly grown on standards, and ripens in the end of July. The Horticultural Society's Catalogue distinguishes this from the *Flemish or short-stalked, also a good cherry, to which it is certainly closely allied.*

The *Morello*. This is a well-known late cherry, much in request for confectionary. The tree is a copious bearer, and on a south wall the fruit acquires a peculiarly rich subacid flavour. It succeeds perfectly well on a north aspect, where its fruit may be retarded to the end of October.

The *Amber*, or Yellow Spanish, is a late fruit, and useful in prolonging the cherry season till the beginning of September. It requires a west wall.

Among other excellent varieties may be mentioned the Black Eagle, the Black Heart, Bowyer's Early Heart, Carnation, Downton, Florence, and the White Heart.

What are called *geans* or *guignes*, are cherries less removed from their natural state. The trees are generally treated as standards, and bear abundantly, particularly when old. The principal sorts are the Amber gean, a plentiful bearer, with sweet tender fruit; and the Lundie gean, bearing a small black cherry of high flavour. This variety originated at the ancient seat of the Erskines in Forfarshire, but is sometimes called the Polton gean, from a place near Lasswade in Mid-Lothian.

It may be noticed, that in the Jardin des Plantes at Paris, the black-fruited cherry-tree, or *Guignier*, is considered as a variety of *Prunus Cerasus*. The forest cherry-tree, *P. avium*, is named *Merisier;* and, besides varieties with red and with black fruit, there is a marked variety called *Bigarotier*.

The great quantities of pale-coloured cherries yearly sold in the London market are generally the kinds called White Heart and Bigarreau. The dark-coloured cherries are chiefly the Courone, which is often passed upon buyers for the Black Heart. What is called Adams' Courone resembles a small May Duke, and is nearly as good, while the tree is a plentiful bearer.

The stock preferred for cherries is the wild gean. Mr Lindley recommends that dwarf cherry-trees should be grafted; and two or three year old stocks will do for them. For standard trees the stocks should be at least four years' old, and they should be budded or grafted five or six feet from the ground. High-stemmed cherry-trees, or *riders*, are often temporarily employed to fill up the vacant spaces on newly planted south walls, till the dwarf trees make sufficient progress; for these, stocks six or seven feet high are required. For dwarf cherry-trees, the best stocks are procured from the Prunus (or *Cerasus*) Mahaleb, the sweet-scented cherry.

Cherries are generally produced on small spurs which appear on the wood of the second year, and these spurs continue productive for an indefinite period. Any form of training may therefore be adopted; but as the fruit is always finest on young spurs, perhaps fan-training, which admits of the frequent renovation of the bearing branches, is the most advantageous. A succession of young shoots should be laid in every year. For the Morello, which is of twiggy growth, and bears on the young wood, the fan form is absolutely necessary. Whatever method be adopted for general practice, care should be taken not to crowd the branches; for nothing is more unfavourable to the productiveness of the trees than overcrowding of branches.

The *Prunus Marasca*, from the fruit of which is prepared the celebrated liqueur called Maraschina di Zara, is a native of Dalmatia, and would doubtless succeed in Britain, if fairly tried.

THE PEAR.

The Pear-Tree (*Pyrus communis*) is considered by botanists as a native of England. Many cultivated varieties seem to have been introduced by the monks; remains of perry orchards attached to monasteries of the fourteenth and fifteenth centuries being not uncommon, even in Scotland, and very ancient trees of the finer dessert pears, such as the Colmar and Longueville, occasionally occurring.

The list of cultivated pears amounts to more than 600 names; but the number of those truly desirable is not large. We shall specify some of the best dessert fruit, following the usual division of Early and Late; the former class being in season in the months of August, September, and October, and the latter in November, December, and January. It is only a few years since pears fit for the dessert in January were known in Britain; such as the Glout morceau, the Easter Beurré and the Winter Beurré; and they deserve the best attention of horticulturists. It is to be premised, however, that even within the limits of Britain climate makes an important difference in the culture and ripening of pears, of which a remarkable and extreme example may be seen in the Chaumontelle,—a fruit which is produced abundantly and ripened on standards in the south-west of England, and even in the environs of London, while it requires a south wall near Edinburgh.

1. *Early.*

Citron des Carmes (*Madeleine* of Lindley, and in Scotland often called the Premature). This is the earliest pear; it ripens in July, acquiring a yellowish-green colour; it is sweet, but without much flavour. One tree, or at most two trees, may suffice. It requires a sheltered situation.

The *Green Chisel*, called also the Hastings, Pear James, or Green Sugar. This is not a first-rate pear; but the tree is hardy and a great bearer. It ripens in August.

The *Summer Rose*. A handsome round pear, of a russety-red colour, much resembling an apple, flesh white, rich and sugary. This is an excellent variety, succeeds on a standard, and ripens in August.

The *Bishop's Thumb* is a hardy orchard pear of good quality, and the tree is a free bearer. The fruit considerably resembles the Muirfowl Egg, but is earlier.

The *Jargonelle* of Britain is the *Grosse Cuisse Madame* of French horticultural writers, and the *Epargne* and *Beaupresent* of French practical gardeners. This is the most common and most esteemed of our early autumn pears. Against a wall the fruit attains a large size and a beautiful appearance; but it is not of so high a flavour as from standards or espalier-rails. The fruit does not keep well, and the tree should therefore be planted in various situations to prolong its season, as it is rather difficult, when it disappears, immediately to supply its place in the dessert. Beautiful dwarf trees may be formed by grafting on the common white thorn, which, however, are not very patient of transplanting. The French jargonelle is green on one side and red on the other, and is a fruit of inferior quality.

The *Ananas d'Eté* is scarcely noticed by our horticultural writers; but it seems a good variety to succeed the Jargonelle. In the Experimental Garden at Edinburgh, it ripens on a standard in the second week of September. It is of middle size, about two and a half inches broad, tapering a little towards the stalk, round at the top, eye small, slightly sunk in a cavity; red on the exposed side, green, and somewhat russety on the other; flesh white, melting, with a pleasant sweet juice. Sometimes called King William Pear.

The *Summer Francréal*, or the Yat of Holland, may be noticed as another pear to follow the Jargonelle, as it ripens about the middle of September. The tree proves, in general, a great bearer.

The *Longueville*. Some very ancient trees of this variety exist at Jedburgh: and in the garden of the Regent Moray at Edinburgh, there are several which apparently are coeval with the times of the Regency. Though the name is now unknown in France, it is conjectured that the tree was brought over from that country by the Douglas, when Lord of Longueville, in the fifteenth century. The fruit is large, of a thick conical shape, green, and of considerable flavour. It ripens in September.

The *Green Pear of Yair*. This variety is of Scottish origin. The fruit is obovate, green, and of a middle size; flesh juicy and well-flavoured. It is sometimes placed against a wall to succeed the Jargonelle; but it is always better from standards. On old trees, in light soils, it sometimes acquires a lemon colour, with a high musky flavour. Ripens in September and October.

The *Duhamel* is a good autumn pear, with a delicate flavour. From a wall, it comes in immediately after the Green Yair, and helps to fill up a gap in the pear season, especially in Scotland : standards produce freely, and their fruit is ready in December.

The *Seckle*, of American origin, deserves a place ; for the tree is of dwarfish size, and suited for a border standard, and it seldom fails to yield a crop. The fruit is small, but melting and perfumed. It does not keep.

Feast's Seedling, raised from the Seckle, is likewise a fine early sort, of American origin.

The *White Doyenné.* This is an excellent sort when used at its perfection. In warm situations it is well adapted for dwarf standards. Ripens in September and October.

The *Red Doyenné*, or as it is sometimes called Gray Doyenné, is also an excellent autumn pear, succeeding best on a quince stock.

The *Elton.* Capital as a standard, and strongly recommended by Mr Knight. The tree produces healthy wood, and the fruit ripens in September and October.

The *Early Bergamot* was introduced from France in 1820. It is one of the very best early pears, as the tree bears freely as an open standard.

The *Autumn Bergamot*, or English Bergamot, has been long known as one of the most highly flavoured pears. It is not the *Bergamotte d'Automne* of the French, which is liable to canker in this country, while the English bergamot is not. In England the tree succeeds perfectly well as a standard; and in Scotland it answers in good seasons, where it is deserving of a west wall. The fruit is of a depressed globular shape, not large; the flesh juicy, sugary, and rich, a little gritty next the core. It ripens towards the end of October, but does not keep.

The *Van Mons Leon Leclerc* is one of the newest and best autumn pears, ripening from the middle to the end of October. It is of the size and shape of the *Duchesse d'Angouleme;* sugary, and with rich pineapple flavour.

To the list of summer and early autumn pears might be added the Musk Robine, Summer Francréal, Summer Bonchretien, and Wilbraham Bonchretien, generally requiring the protection of a wall; and the Lammas Pear of Scotland, "soon ripe, soon rotten," which succeeds perfectly well on open standards; Ambrosia, Belle et Bonne, Beurré d'Amalis, Caillot Rosat, and the Hazel Pear.

2. *Late.*

The *Brown Beurré* (Red and Gray Buerré of various authors) is a first-rate melting pear. Against a wall with a good aspect, and with a fresh soil, the tree is an abundant bearer. Ripens in October and November. A variety raised at Dunmore, and called the *Dunmore Brown Beurré,* is hardy, and produces freely as a standard, but about a month later.

The *Beurré de Capiaumont* is one of the best Flemish varieties. The fruit is melting and well flavoured, and ripens in October and November. The tree is a great and constant bearer, and hardy, answering equally well as a wall-tree or a standard.

The *Muirfowl Egg.* There are two varieties, both of Scottish origin, of which the Galston Muirfowl Egg is the best. The fruit is not attractive in appearance, but it is of admirable quality. The tree is hardy, and should be grown as a standard.

The *Gansel's Bergamot* (sometimes called Brocas Bergamot). This noble pear, which has scarcely been rivalled, certainly not surpassed, by any of the imported varieties, is of English origin. Its blossoms are too tender to enable the tree to succeed as a standard; but it deserves a wall, and it should be placed on various aspects to prolong its season. It almost always blossoms freely; but frequently proves shy in setting: thinning the blossom is found advantageous. The fruit ripens in November and December.

The *Marie Louise.* This excellent and large pear was raised by the Abbé Duquesne, and named after the Empress in the time of Bonaparte. "It is," says Mr Thompson, "one of the very finest, even as a standard, bearing abundantly; it succeeds also well on the north wall." In Scotland it is the better for an east or west aspect; but on a standard in a sheltered garden at Luffness, East Lothian, the fruit has attained the weight of 15 ounces, and it has been produced of excellent quality from standards in the orchard of the Horticultural Society's Garden at Edinburgh. Against a wall in Scotland, it ripens in October and November, and on standards in November and December; in England, it is from a month to six weeks earlier. The tree seems nowise liable to canker.

The *Forme de Marie Louise* is an excellent standard pear, though considerably smaller than the other. In Scotland it ripens freely in October and November.

The *Dunmore Pear* comes into use before the Marie Louise, and is nearly of equal excellence.

Taylor's Seedling, raised at Dunmore, is a good pear, and so hardy as to succeed quite well as a standard.

Napoleon, of excellent quality; from a wall in November and December; and in January from standards, on which it bears freely.

Duchesse d'Angouleme (or *Precel ?*), a very large and showy fruit, requiring a wall; good in January and February, and therefore valuable for lateness.

Buerré d'Aremberg. This pear, if carefully kept in the fruit-room, will, in January, be found perfectly melting and without grittiness, and rich, sweet, and high-flavoured. The tree is hardy, succeeding against an east or a west wall, or as a standard in any sheltered situation, and bearing freely.

The *Crasanne* is an old French sort, of excellent quality, with a tender and finely-flavoured pulp. The tree deserves a south or west aspect on a wall, and it succeeds also on an espalier-rail. The fruit ripens in November and December.

The *Althorp Crasanne* is a first-rate pear, raised by Mr Knight, ripening in October and November; flesh melting, rich, and with a fine rose-water flavour. Succeeds on an east or west wall, or on standards in good situations; the fruit from standards being highest flavoured.

The *Urbaniste* (often called Beurré Spence) is of a large size, flesh melting, with a sweet, well-flavoured juice, and may be regarded as one of the very best pears. In Scotland ripens against a south wall in October; on standards in November.

The *Colmar* is also a first-rate pear, with a white flesh, and of high flavour. In Scotland the tree requires a south or west wall. From this the *Poire d'Auch* of the Continent seems scarcely to differ. It keeps till February or March.

The *Passe Colmar* is an admirable Flemish variety lately introduced into this country; of excellent flavour; hardier, and a more abundant bearer than the preceding, and more easily ripened, either against walls or on standards. It seems well adapted for flat espaliers. The fruit is in maturity in December and January, and extends into February.

Poir Neill was raised by M. Van Mons of Louvain, about the time of the visit of the Caledonian Horticultural Society's deputation to Belgium (in 1817). It is allied to the Colmars, with a very white pulp, mellow, and saccharine and slightly musky juice. It is in season during the month of October, and should be gathered a few days before it be ripe. The tree succeeds as a standard at Edinburgh, bearing freely; and it is regarded as an acquisition to the orchards of the Carse of Gowrie, being calculated to follow the Hazel pear, equally productive, and superior in size and quality.

The *Glout Morceau* (or *Beurré d'Hardenpont*) is excellent, from a wall, in December and January. It has also been found successful as a standard.

The *Winter Beurré* is in season in January and February. The *Ne plus Meuris* is good on standards, and keeps till March, and the tree is a free bearer.

The *Easter Beurré*. Fruit large, obovate, green, and brown; flesh whitish-yellow, melting, and well-flavoured. "It is," says Mr Thompson, "hardy, and a good bearer; one of the most valuable spring sorts. compared with which the early pears of short duration deserve not a wall; its extensive cultivation for a long and late supply is, without hesitation, strongly recommended." In season from January to March. As the tree ripens its wood readily, it succeeds as a low standard, or trained to an espalier-rail, even in Scotland. But the experience of gardeners in the north does not lead them to rank the fruit so high as Mr Thompson does; as, when trained against a south wall, it often proves dry or mealy, with little flavour.

Beurré Diel (named after a distinguished German pomologist) is a large handsome fruit, of the first quality, coming in season in November and December from the wall, and in January from standards. Mr Thompson remarks that its branches should be kept rather thin, its large and abundant foliage being apt to prevent the due admission of sun and air to the fruit.

Beurré Rance, or *de Ranz.* A Flemish variety raised by the late M. Hardenpont, and sometimes called *Hardenpont du Printemps.* It ripens with difficulty in Scotland, requiring a south or west wall; but was found to be the best pear produced in competition a few years since at a March meeting of the Caledonian Horticultural Society. It resembles the Colmars, but keeps longer.

The following, respecting which our limits will not permit us to go into detail, may be considered highly valuable sorts as late autumnal and winter pears; Autumn Colmar, Aston-town, Echassery, Delices d'Hardenpont, Fondante d'Automne, Beurré Bosc, Duhamel, Bezi de la Motte, Chaumontelle, Sylvange, Downton, Louise bonne of Jersey, Swiss Bergamot, Bezi de Quesnoi, Hacon's Incomparable, Winter Nelis, Black Auchan, Swan Egg, Doyenné gris, and Flemish Beauty. The St Germain and Windsor may be added; but the trees are rather liable to canker.

The *Forelle* is one of the most beautiful pears; but it is deficient in the more essential quality of flavour.

The late Mr Knight of Downton raised the following new varieties, which are justly held in high repute: Monarch, March Bergamot, Pengethly, Eyewood, Moccas, Brougham, Oakley Park, Croft Castle, and the Broompark, which last is not only excellent, but remarkably hardy.

Of the *Kitchen Sorts*, or stewing pears, we may name the Double-fleur, Orange d'Hiver, Bellisime d'Hiver, Catillac, Uvedale's St Germain or Belle de Jersey, Warden or Black Worcester, Gros de Lyons, and the Gilogil. The trees are placed against inferior walls, or trained to espalier-rails, or kept as dwarf standards. The Uvedale's St Germain often attains a very large size, especially against a wall; but the Double-fleur is equal in size, and superior in quality.

Pear-trees are grafted either on what are called free-stocks, or on dwarfing-stocks; for the former, which are intended for full-sized trees, the seeds of the wilding-pear should be sown; but frequently the pips of the perry-pears, and sometimes of the common cultivated sorts, are used. For dwarfing, the quince is preferred; but the white thorn, as already mentioned, is occasionally employed. Where the space is limited, or the ground is damp, the dwarfing-stocks are the more suitable. It is a favourite doctrine with some, that by budding or grafting on quince or hawthorn, pears of too melting and sugary a quality acquire firmness and acidity. To what extent this holds good has not been correctly ascertained, but that the stock exerts a certain degree of influence on the fruit is beyond dispute. Some of the finer pears do not take so readily on the quince. In this case double working is resorted to. For example, the Virgouleuse may be easily budded on the quince, and the Beurré d'Aremberg will afterwards succeed freely on the Virgouleuse. It may be mentioned, in passing, that the ancient horticulturists seem to have supposed that a fruit was improved by double working; and that the term *reinette*, a name applied to a class of apples, is considered as having been derived from the Latin *renata*, that is, a tree grafted upon itself.

In selecting young pear-trees, some prefer *maiden plants*, that is, plants having the growth of one year from the graft; but if good trees, trained for two or three years, can be procured, so much the better. It is important to ascertain that the stock and stem be clean and healthy, and to take great care that no injury be done by bruising or tearing the roots in lifting and removing. The young trees may be planted at any time, in mild weather, from the fall of the leaf to the beginning of March. Wall-trees require from 25 to 30 feet of lineal space when on free-stocks, and from 15 to 20 feet when dwarfed. Standards on free-stocks in the orchard should be allowed at least 30 feet every way, while for dwarfs 15 feet may suffice. When the trees are trained *en pyramide* or *en quenouille*, they may stand within eight feet of each other. It is very desirable that the pear orchard should be in a warm situation, with a soil deep; substantially and well drained, or free from injurious latent moisture. Without attention to these circumstances, pear-trees seldom succeed.

The fruit is produced on spurs, which appear on shoots more than one year old; the object of the pruner therefore, ought to be to procure a fair supply of these spurs. The mode most commonly adopted of training wall pear-trees is the horizontal; but each of the forms already mentioned (pp. 45, 47) has its advantages, and is peculiarly adapted to some particular habit of growth in the several varieties. For the St Germain, and other twiggy sorts, the fan form is to be preferred; for the Gansel's Bergamot, and other strong growers, the half-fan or the horizontal. In the latter form the trees may often be found fifteen, twenty, or even thirty years old, during which time they acquire an undue projection from the wall, and become scraggy and unmanageable. On the other hand, the finest fruit is produced on young spurs, clearly indicating the necessity of a frequent renovation of the spurs. This would lead to a preference of the fan form, not, indeed, that which is commonly practised, for in it the spurs are as immoveable as in any other arrangement; but rather that recommended for peaches, in which there is a continual renewal of the branches. Or, if the horizontal form, which has certain advantages, be adopted, it should be that modification exhibited in p. 47 *a*. This is the method followed by Harrison in treating the Jargonelle.

The summer pruning of established wall or espalier-rail trees, consists chiefly in the timely displacing or rubbing off the superfluous shoots, retaining only those which are terminal or well placed for lateral branches. Where spurs are wanted on the older wood, about two inches of a fore-right shoot are left; and if this be done early, that is, before the shoot has become ligneous, it seldom fails to form fruit buds. In horizontal training, the winter pruning is nothing more than adjusting the leading shoots, and thinning out the spurs, which should be kept close to the wall, and allowed to retain only two, or at most three buds. In fan-training, the subordinate branches must be regulated, the spurs thinned out, and the young laterals, which had been loosely nailed in during summer, must be finally established in their places. No crowding of branches should be permitted. When horizontal trees have fallen into disorder, they may be renovated in the manner represented at p. 47 *b*, a procedure patronized by Knight; or all the branches may be cut back to within nine inches of the vertical stem and branch, and trained in afresh, as recommended by Mr Lindley.

When some of the finer pear-trees produce an abundance of blossom, but do not *set* well, as not unfrequently happens, artificial impregnation may be partially resorted to; that is, the blossom of some other kind of pear, plentifully provided with pollen, may be taken, and the farina dusted over the best-looking blossoms of the less productive tree.

Summer and autumn pears should be gathered before they be fully ripe, otherwise they will not in general keep more than a few days. The Jargonelle, as Forsyth rightly advises, should be allowed to remain on the tree, and pulled daily as wanted, the standard fruit thus succeeding the produce of the wall-trees. In reference to the Crasanne, Mr Lindley recommends gathering the crop at three different times, the first a fortnight or more before it be ripe, the second a week or ten days after, and the third when fully ripe. The first gathering will come into eating latest, and thus the season of the fruit may be considerably prolonged. It is evident that the same method may be followed with the Brown Beurré Gansel's Bergamot, and any others which continue only a short time in a mature state.

THE APPLE.

The Apple-tree (*Pyrus Malus*) is, under the name of the Crab, known as a native of Britain. Most of the cultivated sorts, however, are of foreign origin, and it does not seem probable that we possess at present any good variety which is more than two hundred years old. The finer, high-flavoured apples are prized for the dessert; the juicy and poignant sorts are in request for tarts and sauce; while those of a more austere nature are manufactured into cider. In the second edition of the London Hort. Society's Catalogue, no fewer than 1400 varieties are enumerated; many of them doubtless not well ascertained, but about 175 are pronounced to be excellent sorts. With such a multitude before us, it would be vain to attempt detailed descriptions; we shall therefore do little more than give a classified list of those most worthy of attention, referring the reader for further information to the Catalogue itself, to Mr Lindley's Guide to the Orchard and Kitchen Garden, and to Peter Lawson & Son's Fruit-Tree List.

Table Apples.

The earliest of these are the following :—The Juneating, or White Geniton, which begins to ripen in the end of July, and being sugary and slightly perfumed, forms a welcome addition to the dessert. The Early Margaret is often cultivated; it is sometimes called Red Juneating or Striped Juneating, and in Ireland Peach Apple. The Summer Crofton, or White Crofton, is of Irish origin : the tree bears abundantly; and if the fruit be scarcely equal to the Juneatings for the dessert, it is very desirable for culinary purposes in August. The Summer Thorle, originating in the Carse of Gowrie, is an early apple of considerable merit, although not mentioned by Mr Lindley. The Oslin or Arbroath Pippin, and the Early Julien of Clydesdale, also deserve notice. The Summer Golden Pippin, the Red Quarrenden of Devonshire, and the Early Harvest, are likewise excellent early dessert apples.

To succeed these in the autumn we have many fine sorts, such as the Early Nonpareil or Hicks's Fancy, having a lively juice; the Doonside, a capital Ayrshire production, the tree being at the same time hardy and very productive; Autumn Pearmain or Royal Pearmain of the London nurseries; Shepherd's Fame; Baird's Favourite; White Astrachan; Maclean's Favourite : Pearson's Plate ; Pomme de Niege, and Bourassa ; Franklin's Golden Pippin, fruit not equal to the Old Golden Pippin, but the tree more productive; Old Golden Pippin; King of the Pippins or Hampshire Yellow, a valuable sort; Please Lady; Kerry Pippin, one of the finest Irish apples; and the Cole Apple or

Scarlet perfumed. The Lady Wemyss of Fifeshire is suited either for dessert or kitchen use, and the tree is a free bearer. Leisham's Pippin, a large fruit; Longville's Kernel, of good quality.

The winter dessert apples are very numerous, so that only a few can be mentioned. The Ribston Pippin has long maintained a pre-eminent character, for its rich juiciness and highly aromatic flavour. If the tree be trained to a wall, the fruit is much improved in size and beauty; but Mr Rogers is wrong in thinking that it is thereby heightened in flavour: the flavour, on the contrary, being deteriorated. The Ribston is an old variety; and there is reason to fear that, like the Gray Leadington (formerly the boast of Scottish orchards), it is verging to decay and extinction. Hubbard's Pearmain is a Norfolk apple of the very finest quality, and too little known, especially in Scotland; the tree does not grow large, is quite hardy, and an abundant bearer, either as a standard, or when trained to an espalier-rail. The Dutch Mignonne is another admirable dessert apple, too little known or attended too. The Golden Harvy, or Brandy Apple of Forsyth, is a beautiful though small fruit, and Mr Lindley characterizes it as rich, juicy, spicy, and high-flavoured: the tree is not a large grower, is very hardy, and a great and constant bearer; and no garden, adds Mr Lindley, "capable of containing ten trees, ought to be without one of it." The Downton Pippin, raised by Mr Knight from the Orange Pippin of Herefordshire, dusted with the pollen of the Old Golden Pippin, must not be omitted. The tree is a great bearer; the fruit ripens in the end of October and keeps till January: it has a brisk subacid juice, which becomes saccharine. The fruit should not be gathered until it have acquired a bright yellow colour, and part freely from the tree. The Yellow Ingestrie, raised by the same gentleman, is likewise excellent. To these may be added the Beachamwell; Borsdoffer; Court of Wick Pippin, excellent, though of small size; Wood's Transparent; Margill; Scarlet Crofton; Golden Pearmain; Scarlet Pearmain; Dutch Mignonne; Fearn's Pippin; Gravenstein; Paradise Pippin; Old Nonpareil; Ross Nonpareil; Braddick's Nonpareil, very fertile; Scarlet Nonpareil; Pitmaston Nonpareil; Sturmer Pippin; Kirke's Golden Rennet; Reinette de Canada; Skyehouse Russet; Cornish Aromatic, of first-rate quality; and the Sam Young, an excellent Irish apple brought into notice by Mr Robertson of Kilkenny. The Courtpendu plant is a capital winter dessert fruit: the tree is hardy and productive, and the blossom being late in expanding, it is a kind well adapted for cold situations. The Norfolk Beaufin is the best apple for drying and preserving, making an excellent winter preserve.

Of American apples, the best for our climate is the Boston Russet. Mr Thompson states that the tree is quite hardy, very productive, and suitable for dwarf training; the fruit juicy, with a flavour between that of the Ribston and Nonpareil, and in season from December till April. The Newton, or Long Island Pippin, seldom comes to perfection in this country.

Kitchen Apples,

or such as are chiefly used for tarts or for sauce, are very numerous, and the names of a few of the best can only be given. We begin with the Scottish Hawthornden: though the tree is liable to canker, yet it comes early into bearing, and the fruit is excellent. The Codlins may be next named, particularly the Spring Grove, the Kentish or Fillbasket, the Keswick, the Dutch, and the Manks. The Red Fulwood, the Nonsuch, Minshul Crab, Hanwell Scouring, Cat's Head, Alexander Brabant, Wheeler's Russet, Blenheim Orange, Hunthouse of Yorkshire, and Forman's Crewe, all are good. The Bedfordshire Foundling is a large and handsome apple, and the tree a sure bearer. The Cellini is a good kitchen apple, for November, the tree hardy and very productive, and the fruit beautiful. Among the best long-keeping apples are the Scottish Gogar Pippin, sometimes called Moncreiff Pippin, or Stone Pippin; Alfriston; Wormsley Pippin; and the Yorkshire Greening and Northern Greening, particularly the latter; Baxter's Pearmain; Winter Strawberry Apple; the Tulip, a small Dutch fruit, of a dark red colour, and with a lively juice; Bellefleur of Brabant; Calvills Malingre; Dutch Mignonne; Winter Lud; Pentcaitland Pippin; Cambusnethan Pippin; the Alderston Pippin of East Lothian. The Cockle Pippin or Nutmeg Apple, an excellent apple, and the tree a fertile bearer. The Wellington, otherwise called Dumelow's Seedling, is a very juicy kitchen apple, and keeps firm till April, and the tree is not liable to canker. The Green Fulwood of Mr Matthew is a good kitchen apple, and keeps till May. The same may be said of the Hoary Morning, and the tree is a great bearer. The Cockpit is a useful culinary apple for winter; the tree hardy and a great bearer. The New Cockpit is an excellent apple, remarkably perfumed. An apple, called the French Crab (but which is of a considerable size, notwithstanding this name), keeps firm in substance till the return of the apple season; and the subvariety of this, called Hambledon's or Deux-ans, is described in Ronalds' "Pomona" as still superior. Several apples of Scottish origin are of great merit, though not recognized in the writings of Lindley or Rogers; such as the Pow Captain, the Kinnoul Codling, Tam Montgomery, and the Tower of Glammis.

Some excellent new varieties of apples have of late years been produced both in England and Scotland. Mr Hardy of Bothkenner, by crossing the Court of Wick Pippin with the Nonpareil, has raised seedlings partaking of the good qualities of both parents, and these have received the warmest approval of the Scottish Horticultural Society.

It may be mentioned, that information respecting the fruits cultivated for the manufacture of cider and perry, may be obtained in the "Pomona Herefordiensis," illustrated with engravings by the late Mr W. Hooker. Cider is principally made in Herefordshire and Gloucestershire, which are called the cider counties; but much also is produced in Devonshire. For the encouragement of its manufacture in Scotland, premiums have been offered by the Caledonian Horticultural Society, but little good Scottish cider has hitherto appeared.

Several kinds of stocks are used for apple-trees. The Dutch *Paradise*, propagated by layers, has long been used as a stock for dwarf apple-trees, whether intended for the wall or for standards. The *Doucin* of the French seems closely allied to this, if not identical with it. The bur-knot varieties increased by cuttings, or young codlin plants procured from layers, furnish convenient stocks for trees from which it is hoped to procure desirable seedlings. For common purposes, the stocks raised from the pips of crabs or of cider apples are preferred. Stocks kept one or two years in nursery-lines are fit for grafting upon; but if a considerably tall stem be wished, they must remain three or four years in the nursery, and be pruned up, till they attain five or six feet of height. In the Dutch nurseries, where apple-trees are trained for some years to the cup-shape, the table, the pyramidal, or the bulb forms, before being sold to the public, the trees are repeatedly transplanted; but with us, where such forms are less sought after, the utility of more transplantations than from the seed-bed to the nursery-lines, and thence to the garden, may be questioned. Any common soil, provided the subsoil be dry, suits the apple-tree. Shallow planting should, in all cases, be practised, and young trees should be carefully staked, to prevent wind-waving.

The fruit, as in the pear-tree, is produced on spurs, which come out on the branchlets of two or more years' growth, and continue fertile for a series of years. There is, therefore, no very material difference in the pruning and training of the pear and of the apple tree. On walls, the horizontal mode of training is commonly followed, as best calculated to repress the too vigorous growth of the tree; but for the Nonpareil, and other twiggy varieties, perhaps the fan form, or some modification of the fan form, is preferable. For standards, where the soil is rich and the growth rapid, all that is necessary in pruning is to thin out the branches, and to prevent their crossing and rubbing against each other. Where there is little luxuriance, as in the case of all dwarfs, it is useful to shorten the branches occasionally, and to remove useless twigs. Dwarfs on paradise stocks may be treated almost like currant-bushes; that is, making them open in the centre, or cup-shaped, to the great advantage both of the size and beauty of the fruit. The general winter pruning may take place any time from the beginning of November to the beginning of March. After the winter pruning, some cultivators delay the shortening of the young wood of the former year till the middle or end of April, when the buds have swollen. Cankered or diseased wood, and all unfruitful snaggs or ragged spurs, are then to be neatly cut out. Where the scars are large, they should be laid over with some composition calculated to resist the action of the air and rain.

If the American blight, or woolly aphis (the *Eriosoma Mali* of Leach) make its appearance on a tree, the utmost care should be taken to clean every part of the bark with a hard brush and some searching wash; for, should the insect be left unmolested, it will speedily spread over all the apple-trees in the neighbourhood. It is often introduced with imported trees brought from distant nurseries: when this is observed, the pest is so grievous, that the entire sacrifice of two or three trees is a small price to pay for its removal. Mr Waterston, in his Essays on Natural History, recommends a simple remedy, which he found effectual, viz., mix clay with water till it be of a consistency to be applied like thick paint to the injured parts, either with a trowel or a brush: a second coat upon the first fills up every crack which may shew itself when the first coat becomes dry:

the clay resists for a sufficient length of time the effects both of sun and rain, and before it gradually falls off, every insect is completely smothered.

For the *Storing of Pears and Apples,* there should be attached to every considerable garden a commodious fruit-room, well ventilated, furnished with fire-places or stoves to exclude frost, and fitted up with a variety of shelves. A northern aspect is the most suitable; and it is also desirable that there should be a dry, cool cellar under it, to be employed in retarding the maturation and decay of some of the more fugitive varieties. All the fruit intended for keeping should be plucked with the hand, or with such an implement as the fruit-gatherer, invented by Mr Saul of Lancaster. For the finer dessert fruits the shelves should be made of hard wood, not of fir, and the fruit should be laid upon cartridge or writing paper, to prevent its imbibing any taint from the wood. The kitchen fruit may be kept in layers two or three deep, but not in heaps, and should be occasionally examined, when decaying fruit is to be removed. The *sweating* of apples and pears, formerly much practised, is now abandoned, as being attended with no useful effects.

THE QUINCE.

The Quince (*Cydonia vulgaris*), allied to the apple, is a native of the south of Germany. It is but little cultivated in Britain. The fruit, which is austere when raw, is well calculated for giving flavour and poignancy to stewed or baked apples. The two principal sorts are the Portugal Quince and the Pear Quince, of which the latter is the most productive, while it serves the usual culinary purposes equally well as the other. Quinces may be propagated by layers, or by cuttings, or by grafting. Two or three trees planted in the slip or orchard are in general sufficient. In Scotland, the fruit seldom approaches maturity, unless favoured by a wall.

THE MEDLAR.

The Medlar (*Mespilus germanica*) is a native of the south of Europe,but has been naturalized in some parts of the south of England. The varieties worth notice are the Dutch Medlar, with broad leaves; and the Nottingham Medlar, with narrow leaves; of these the latter is considered the best. The fruit is gathered in November, and kept till it begins to decay, when it is served up in the dessert, and highly relished by some. The treatment recommended for the Quince may be applied to the Medlar.

THE SERVICE-TREE.

The Service-Tree (*Pyrus domestica*) is a native of the mountainous parts of Cornwall, and though not much cultivated, may be here noticed. The fruit has a peculiar acid flavour, and is used only when thoroughly mellowed by keeping. There is a pear-shaped, and also an apple-shaped variety, both of which may be propagated by layers, and still better by grafting on seedling plants of their own kind. Two or three trees may have a place in the orchard, or perhaps in a sheltered corner of the lawn. The tree is seldom productive till it has arrived at a goodly age. The fruit is brought to Covent Garden Market in winter; but it is never seen at Edinburgh. Near Paris, the tree is a good deal cultivated under the name of *cornier*; and there are a number of varieties of the Service grown in the north of Italy.

THE MULBERRY.

The Mulberry (*Morus nigra*) is a native of Persia, and in this country requires a warm sheltered situation. The fruit is in request for the dessert during the months of August and September, having a rich aromatic flavour, and a fine subacid juice. Where it is abundant, wine is made from it. In Devonshire, a little of the juice added to full-bodied cider, produces a delicious beverage, called Mulberry Cider, which retains its flavour for many months. The Mulberry is propagated by cuttings or by layers, but, to expedite the production of fruit, it is useful to inarch small bearing branches on stocks prepared in flower-pots. Mulberry standard trees succeed only in the southern counties. These require no other training than an occasional thinning out of the branches. They are generally planted on grassy lawns, so that when ripe fruit falls from the higher branches, it can be gathered up without having sustained injury. In the middle districts, espalier-rails may be employed, particularly under the reflection of a south-wall. In colder situations, the mulberry must be treated as a wall-tree; and it has been recommended that the bearing shoots should be trained perpendicularly downwards. Knight strongly advised the forcing of this fruit in flower-pots, much in the same way as is done with figs. The Mulberry as a fruit is little known in Scotland; but a few aged trees exist in old gardens, and in favourable seasons afford berries.

THE HAZEL-NUT.

The Hazel (*Corylus Avellana*), one of our indigenous edible nuts, is the original parent of the red and white Filbert, Cobnut, Crossford-nut, Frizzled, Spanish, and other improved varieties. These succeed best on a rich dry loam, carefully worked, and receiving from time to time a slight manuring. They are generally planted in the slip, but thrive best in a quarter by themselves. The varieties are propagated by layers or by suckers; but where there are stocks of the common hazel, the other kinds may be grafted upon them. The Cosford is generally preferred, being thin-shelled, and having a kernel of high flavour. If the Filbert or the Cosford be grafted on small stocks of the Spanish nut, which grows fast, and does not send out side-suckers, dwarfish prolific trees may be obtained; and by pruning the roots in autumn, the trees may be kept dwarf.

The neighbourhood of Maidstone in Kent has long been celebrated for the culture of nuts for the London market; and as the best Kentish practice is scarcely known in other parts of Britain, we may enter a little into detail. The young plants are almost always suckers from old bushes, and are planted about ten or twelve feet apart. They are suffered to grow without restraint for about three years, and are then cut down to within a few inches of the ground. They push out five or six shoots; and these in their second year are shortened one-third. A hoop is then placed within the branches, and the shoots are fastened to it at nearly equal distances. In the spring of the fourth year, all the laterals are cut off close by the principal stems, and from these cut places short shoots proceed, on which fruit is expected in the following year. Those which have borne fruit are removed by the knife, and an annual supply of young shoots is thus obtained. The leading shoots are always shortened about two-thirds, and every bearing twig is deprived of its top. In the early spring-pruning, attention should be given that a supply of male blossoms be left, and all suckers should be carefully eradicated. These Kentish nut-plantations somewhat resemble large quarters of gooseberry-bushes, few of the trees exceeding six feet in height. For additional information the reader may be referred to a paper on this subject by the Rev. Mr Williamson, in the fourth volume of the Transactions of the London Horticultural Society.

THE WALNUT.

The Walnut (*Juglans regia*) is a native of Persia, and the south of the Caucasus; in Britain, therefore, the fruit seldom comes to complete maturity, except in the warmer districts. Besides the common walnut, there are several varieties cultivated, particularly the Large-fruited or Double Walnut, the Tender-shelled, and the Thetford or Highflyer, which last is said to be by far the best walnut grown. The varieties can be propagated with certainty only by budding or inoculating; but the operation is rather nice, and not unfrequently fails. Knight's method is described in the London Transactions, vol. iii., p. 133. Plants raised from the seed seldom become productive till they are twenty years old. The fruit is produced at the extremities of the shoots of the preceding year; and therefore in gathering the crop, care should be taken not to injure the young wood. In Kent, the trees are thrashed with rods or poles; but this is rough, and far from being a commendable mode of collecting the nuts.

THE CHESNUT.

The Chesnut (*Castanea vesca*), like the preceding, has long been an inmate of our woods, in which it grows to a great size; but it seldom ripens its fruit in the northern parts of the island. Several varieties, remarkable for their productiveness and early bearing, have of late years risen into notice; particularly Knight's Prolific, the New Prolific, and the Devonshire. These are propagated by grafting upon stocks raised from nuts; and when grafts are taken from bearing wood, fruit may be produced in a couple of years. The tree thrives best on a dry subsoil.

SMALL FRUITS.

The Red, White, and Black Currant, the Gooseberry, the Raspberry, the Strawberry, and Cranberry, are usually cultivated in our gardens, under the title of Small Fruits. Their economical uses in cookery, confectionery, and in the manufacture of home-made wines, attach to them considerable importance, and render desirable a separate account of them, however brief.

The Currant.—The *Ribes rubrum* includes as its varieties our Red and White Currants. The principal subvarieties are:

Common Red.
Red Dutch.
Knight's Sweet Red.
Champagne.
Common White.
Dutch White.

Red and white currants are readily propagated by cuttings. They succeed in any sort of common garden soil; but seem to thrive best in warm, moist situations, where they enjoy an abundance of air. A few plants are sometimes placed against walls, on which they are trained perpendicularly. Currants are sometimes planted in single lines in the borders which separate the plots in the kitchen garden; but it is generally better to confine them to compartments by themselves. In these they should be arranged in quincunx order, at six feet between the lines, and six feet apart in the line. They may be transplanted at any time between the fall of the leaf and the first movement of the sap. They are trained as bushes, from single stems of about a foot in height, care being taken to prevent the main branches from crossing each other, In winter the young bearing wood on the sides of the branches is shortened down into spurs from an inch to two inches in length. The leading shoots are left about six inches long. Some careful cultivators reduce the young shoots to about half their length as soon as the fruit begins to colour, an operation which, in consequence of the more free admission of sun, is found to increase the size and improve the flavour of the berries.

Of *Ribes nigrum*, or Black Currant, there are several varieties, of which we need mention only the Common Black, and the Black Naples. The latter is accounted the preferable sort. The black currant thrives best in a moist, deep soil, and shady situation. Its culture is much the same as that of the other currants, but the young shoots are not spurred. All the pruning necessary is to keep the branches free of each other, and to promote a succession of young wood.

The GOOSEBERRY.—Botanists distinguish two species: *Ribes Grossularia*, or rough-fruited gooseberry, and *R. Grossularia Uva-crispa*, or smooth-fruited gooseberry. The gooseberry has always been a favourite fruit in Great Britain, and is said to be produced in the middle districts of the island in greater perfection than in any other part of the world. Many very large sorts have originated in Lancashire, where the culture has been carried to a high degree of refinement; but it is to be regretted that *weight* seems, unreasonably enough, to be regarded, in the prize competitions in that duchy, as the *sole* criterion of excellence. Berries of twenty or even twenty-four pennyweights are boasted of; but such Goliaths are almost always inferior in flavour. The following are some of those sorts recommended in the catalogue of the *London Horticultural Society*.

Red.—Red Champagne, Ironmonger, Rob Roy, Small Red Globe, Keen's Seedling, Lord of the Manor, Leigh's Rifleman, Red Warrington, Wellington's Glory, Shipley's Black Prince.

Yellow.—Yellow Ashton, Yellow Champagne, Golden Yellow, Smiling Beauty, Smooth Yellow, Yellowsmith, Rumbullion.

White.—Bright Venus, White Champagne, Cheshire Lass, White Crystal, White Damson, Whitesmith, White Honey.

Green.—Green Gascoigne, Pitmaston Green-gage, Langley Green, Late Green, Green Laurel, Gregory's Perfection, Green Walnut, Jolly Tar, Cupper's Bonny Lass.

Some admirable new varieties have of late years been raised in Scotland, particularly in Perthshire; the Delvine Porcupine, New Ironmonger, and Mignonette, are not surpassed by the finest of the English productions.

In forming his collection, the horticulturist should especially select a few early and a few late sorts, and by properly disposing the bushes in various situations in his garden, he may prolong the fruit season by several weeks. The same object may be further promoted by defending the fruit of the late sorts from the attacks of wasps, which is accomplished by surrounding the bushes with bunting (the thin stuff of which ship's flags are often made); and also by retarding the ripening of the fruit, which is done by covering up the bushes with bast-mats. This last contrivance, however, answers better with currants than with gooseberries.

The gooseberry-bush affects a loose rich soil, which readily imbibes, but does not retain, much moisture. Gooseberries, like currants, may be grown in lines or compartments. They are propagated by cuttings, and may be transplanted, in open weather, during any of the winter months. They are trained with single stems, from six inches to a foot high; and all suckers, which are apt to spring up from the roots, should be carefully removed. Formerly it was the practice in Scotland to spur all the annual wood; but now the black-currant system of pruning is more generally and advantageously followed. The ground on which the bushes stand is carefully digged once a-year; and manure, when necessary, is at the same time added. No further culture is requisite than keeping down weeds, and preventing the extensive ravages of caterpillars. This last object is best attained by employing persons (women and children) to pick them off on their first appearance. Gooseberry plants are sometimes trained on walls or espaliers, to accelerate the ripening, or increase the size of the fruit.

The Raspberry (*Rubus Idæus*) is, like the preceding small fruits, a native of Great Britain. The principal varieties are :—

Red Antwerp.
Yellow Antwerp.
Barnet.
Red Globe.
Cornish.
Williams' Double Bearing.

Of these, the two first have never been surpassed, and are generally sufficient for all common purposes. Raspberries are propagated from suckers, which are planted in rows five or six feet apart, and at three feet from each other in the rows. The fruit is produced on small branches which proceed from the shoots of the former year. Every year they throw up a number of shoots or canes from the root, which bear fruit the subsequent year, and then decay. In dressing the plants in winter, all the decayed stalks are cut away, and of the young canes only three or four of the strongest are left, which are shortened about a third. As the stalks are too weak to stand by themselves, they are sometimes connected together by the points in the manner of arches, so as to antagonize and mutually support each other, and sometimes they are attached to stakes. Perhaps the best support is obtained by fastening the points of the shoots to a slight horizontal rail or bar about four feet high, and placed a foot and a half on the south side of the rows. By this means the bearing shoots are deflected from the perpendicular to the sunny side of the row, and are not shaded by the annual wood. The ground between the rows should be well digged in winter, and kept clean. Fresh plantations of raspberries should be made every six or seven years. The double-bearing varieties, which continue to bear during autumn, require light soils and warm situations. It may be mentioned that the crop of any of the varieties may be retarded by breaking off the points of the bearing shoots at an early period in spring; but, like all other fruits, the flavour of the raspberry is highest when it is allowed to ripen at its natural season.

The STRAWBERRY (*Fragaria*) belongs to the same natural family as the raspberry. Amongst the numerous kinds cultivated in our gardens, botanists have distinguished several *species*, but as these distinctions imply no difference in culture, and as it is difficult to trace them amid the sportings of the hybrids, we shall not pretend to enumerate them. Scarcely any plant more readily slides into seminal varieties; and indeed, till lately, in consequence of the irregular prevalence of local names, their whole nomenclature was a chaos of confusion. At the instance of the Horticultural Society of London, Mr Barnet undertook a revision of the subject; and, with great acuteness and discrimination, has removed much ambiguity, and finally settled the names of the existing varieties. His paper, which is well worth the perusal of every student of horticulture, is in the sixth volume of the London Transactions. In the second edition of the Catalogue of the London Horticultural Society, no fewer than 112 varieties are enumerated; but the following are sufficient, and an asterisk is prefixed to those most worthy of cultivation in small gardens:—

* Old Scarlet or Virginian.
* Grove-End Scarlet.
* Keen's Seedling.
* Roseberry.
Downton.
* Knevett's.
* Elton.
American Scarlet.
Coul Late Scarlet.
* Princess Alice.
* Old Pine or Carolina.
Wilmot's Superb.
Myatt's Pine.
* Myatt's British Queen.
* Large Flat Hautbois.
* Prolific Hautbois.
* Alpine, red and white.
* Wood, red and white.

Myatt's British Queen, the Elton, and Keen's seedling excel in size and beauty, Myatt's Pine in delicious flavour; but the fruit of this last is produced sparingly.

The strawberry plant is propagated either from runners or from seed. When runners are employed, they are sometimes planted in autumn, or rather as soon as they have struck root into the ground. Most commonly, however, they are permitted to remain unseparated from the parent plants till spring; a practice not to be commended, for it debilitates the old plants, and prevents the earth between the rows from being stirred and cleaned: deep digging between rows is calculated to destroy the roots, and ought to be avoided. As, upon the whole, spring planting seems to be more generally followed, it would perhaps be well to adopt the practice of some gardeners, who are at pains to prick out the off-sets, as soon as they are rooted, into beds of rich soil, from which they are transplanted into their proper places early in the spring. The more modern practice, however, is to plant in July, when a good crop can be obtained the following year, besides being from eight to ten days earlier than older plants.

The desire of new varieties has encouraged the practice of propagating by seed; and Keen, Knevett, Myatt, and others, have been extremely successful. Mr Knight having observed that the young runners of the alpine strawberry flower and ripen fruit the first year, was led to adopt this mode of reproduction, and followed it with the happiest success. Early in spring he sowed the seed in flower-pots, which were put into a hotbed; and as soon as the plants attained a sufficient size, they were transplanted into the open ground. They began to blossom soon after midsummer, and continued to produce fruit till interrupted by frost. Thus Mr Knight is inclined to treat the alpine strawberry as an annual plant. The same practice has been recommended in France by M. Morel de Vindé (*Cal. Hort. Mem.*, vol. iii.); but he very properly preserves his plants for three years, sowing every year a successional crop. Keen applied this method of culture to the wood strawberry; and we doubt not but it might be extended with beneficial effects to the Old Scarlet and others of the less artificial varieties.

A clayey soil or strong loam is considered as best suited to strawberry plants. On a sandy or very light soil they seldom succeed; and in very close situations, and over rich ground, most varieties produce little else than leaves. Before planting, the ground should be manured and trenched, or digged over deeply, and when stiff and compact it should be very carefully worked.

The market-gardeners in the neighbourhood of London grow their strawberries in beds, three rows in each, with an alley between them while those of Edinburgh; plant in rows two feet asunder, and from a foot to fifteen inches in the rows. When the weather is dry, the young plants are watered till they are well established. As little fruit is produced the first year, a line of carrots, onions, or other vegetables, is often sown between the rows for one season. In May the runners are cut off, with the view of promoting the swelling of the fruit. During dry weather, careful cultivators water their plants while in flower, and particularly after the fruit is set, and occasionally till it begins to colour. The old practice, from which the fruit derives its name, of laying straw between the rows to prevent the soiling of the fruit, has been recently revived: and where there are dressed lawns, the short cut grass may be employed for the same purpose. As soon as the fruit season is over, the runners are again removed; the straw or grass is taken away, and the ground hoed and raked. In October the runners, and also the reclining, *but not the erect*, leaves are cut away, and the surface of the earth is stirred with a three-pronged fork, great care being taken not to injure the roots. Strawberries may be raised from the same ground for an indefinite space of time; but the plants should be renewed every third or fourth year. They are, however, never so good after the third year, unless the soil is a stiff and rich clay. In the garden they are generally put in a quarter by themselves, and it should be one fully exposed to the sun and air. The alpine and wood varieties may be placed in situations rather moist and shady, as edgings in the slips, or in rows behind walls and hedges, in which situations they succeed perfectly well, and produce fruit late in the season.

If strawberries be planted on a good border, in rows a yard asunder, a crop of early peas may be taken between the rows; and the peas may be succeeded by Cape broccoli, which seems not only not to be hurt by the excretion from the roots of the peas, but to remove any noxious quality thus imparted to the soil. The regular manuring for these crops keeps the strawberries in good vigour.

Strawberries have always been a favourite dessert fruit. They likewise form an excellent preserve; and from their freedom from excess of acid, seem well adapted to the manufacture of home wine. For this purpose they have been only partially employed; but the samples of strawberry wine which we have tasted had more of the vinous flavour than any other of our domestic wines. The culture of strawberries is the most lucrative part of the employment of the market-gardener, at least near large towns. It is not uncommon for him to realize a clear profit of £25 or £35, or even more, per imperial acre of strawberry ground. The greater the diligence and assiduity of the cultivator, the greater will be his returns. It is a common and just remark, that too little labour is in general expended upon the strawberry, and by the ignorant and unskilful gardener least of all.

In some places a strawberry bank is formed by a ridge of earth, consisting of rich loam if possible, about six feet broad at the base, and about five feet high in the centre, running nearly from north to south. Along the centre of the ridge a narrow channel is made, into which water may be poured, so as to percolate the sides. Along the sloping sides bricks are placed like the steps of a stair, and in the interstices between the bricks strawberry plants are inserted. In this way the plants have the fullest advantage of sunshine, the fruit is kept perfectly clean, and its early maturity is promoted by the reflected heat of the bricks.

Strawberries are extensively forced. The Old Scarlet, Old Pine, Roseberry, Grove-End, and Keen's Seedling, are found suitable for this purpose. The latter has the advantage of being early, prolific, and yielding large fruit; but the Old Scarlet and the Old Pine have the superiority in flavour. The plants must be in a course of preparation for nearly a year before fruit can be expected. They are potted in April with rich soil, two or three young plants being put into a pot of eight or ten inches in diameter. During summer they are kept in a warm situation and encouraged to grow, flowers and runners being carefully picked off. In the beginning of winter they are sheltered in cold frames, and they are afterwards successively placed into hot-beds or forcing-houses, so as to keep up a succession of fruiting plants. The air should be kept moist, and they must be plentifully supplied with water. Where the means are abundant, a moderate supply of ripe fruit may thus be maintained during the late winter and the spring months. Some cultivators provide new plants for forcing every year. But the same plants may be forced for several successive years, provided they are shifted in August, and, at the time of re-potting, the black torpid roots are cut off, leaving only those of a paler colour, and which are connected with the new shoots or offsets.

THE CRANBERRY.

The culture of the American Cranberry (*Oxycoccus macrocarpus*) was introduced by Sir Joseph Banks. The plant is distinguished by the smoothness of its stems, and the largeness of its fruit. It grows freely, and produces fruit readily in any damp situation; but where there is a pond, it may be cultivated with the greatest success. On the margin of the pond stakes are driven in, a short way within the water line; and boards are so placed against these as to prevent the soil of the cranberry-bed from falling into the water. A layer of small stones is deposited in the bottom, and over these, peat or bog earth, mixed with sand, to the extent of about three or four inches above, and half a foot below the usual surface of the water. Plants of the American cranberry placed on this bed, soon cover the whole surface with a dense matting of trailing shoots. There is a variety which is very shy in yielding its fruit, and this should, of course, be avoided. If the prolific variety be employed, from a bed thirty or forty feet in length, by five or six in breadth, a quantity of berries may be procured sufficient for the supply of a family throughout the year. The fruit is easily preserved in bottles.

The Native cranberry (*Oxycoccus palustris*) may be treated in the same manner, and in some places is very successfully cultivated. At Culzean Castle, in Ayrshire, I found the cranberry ground surrounded by a ditch, the water of which was made to filter through among stones and stakes to the interior, so as to keep the cranberry plants constantly supplied with moisture. In the same garden a second compartment was dedicated to small fruits of this class, having in the centre a rock-work planted with whortleberries (*Vaccinium Vitis Idœa*), and around the rock-work beds of American Cranberry, of Scottish Cranberry, and of Crowberry (*Empetrum nigrum*), also native.

The following plants produce fruit, some of them abundantly in a wild state, others sparingly in our gardens; but they can scarcely be said to come within the province of Horticulture: *Berberis vulgaris*, the Barberry; *Sambucus nigra*, the Elder; *Prunus spinosa*, the sloe; *P. insititia*, the Bullace; and *Rubus Chamamorus*, the Cloudberry.

THE FORCING GARDEN.

PRELIMINARY REMARKS.

The term *forcing* is strictly applicable only to those artificial processes by which vegetation is in a considerable degree accelerated; but in common language it has been applied to all those operations in which glazed frames or houses are concerned, though they may be employed merely in aiding the common progress of nature, or in counteracting the great vicissitudes of our climate. For the sake of convenience, we shall adopt the term in its broadest acceptation. After some preliminary observations, we shall first treat of the structures, and then of the fruits and vegetables which are cultivated in them.

The principal object of hothouses, and other structures of a similar nature, is to produce an artificial temperature and humidity of the atmosphere, which shall resemble, as nearly as possible, the climate in which the fruits or plants naturally flourish. A command of heat is obviously a primary requisite. A regulated admission of air, and the presence of a certain degree of moisture, are, in the next place, necessary. Lastly, without the free access of light, plants become blanched, or are destroyed by the moisture which they generate. These, then, are the conditions which limit the form of hothouses; when these are attained, any form may be adopted which invention can devise, or wealth execute; but every true lover of the art will aim at simplicity, and will deprecate useless expenditure, so often exhibited in this department, as injurious to the character as well as to the progress of horticulture.

Artificial Heat.—Forcing-houses are heated in various ways; by means of *flues* conveying smoke and heated air; by *pipes* conducting steam or hot water; by so constructing the glazed house as to increase the calorific action of the sun's rays; and sometimes by the heat generated in the course of the fermentation of vegetable substances.

Flues are generally constructed of common brick, though occasionally fire-brick is employed in the *neck*, or that part of the flue immediately adjoining the furnace. The bricks in the side walls are placed on their edges, and the top covering is of tile an inch and a half in thickness. In districts where sandstone flag abounds, the covers are often formed of that material. Horticultural writers have recommended that flues should be about eighteen inches deep, and of nearly equal breadth; but to obtain the greatest quantity of heat, the breadth should, where possible, be nearly double the depth. It is advantageous to detach flues as much as possible from the walls of the building which inclose them, in order that the heat may be communicated to the air only. Formerly they were often built, one above another, with only one side exposed; a practice which, as it occasioned great waste of heat from conduction, has been generally abandoned. When it is necessary to lead one flue above another, or to make it return upon itself, spaces should be left between them, to allow the free passage of caloric from every side.

With a view to economy of fuel, can-flues and cast-iron cylinders have been proposed, and occasionally adopted; but their use has not hitherto become general. The arrangement of the flues must depend upon the nature of the house; it may, however, be remarked generally, that, as heated air has a tendency to ascend, they should be placed as near as can conveniently be done to the front of the house, where, of course, the sloping roof is lowest. It is likewise important that the flue should be introduced, and exert its greatest influence, at that part of the structure which is most exposed to any refrigerating cause.

The furnace is most properly situate behind the house, and is generally covered by a shed. For the most part it is constructed so that the upper part of its arch shall be on a level with the top of the flue; but where a considerable heat is required, as in pine-apple stoves, it is found preferable to sink the furnace, in order to produce a *neck* or rise of about a foot and a half in height, which moderates the intensity of the heat on its first entrance, and, by increasing the draught, causes the fire to burn freely. The size of the furnace must be regulated by the kind of fuel employed. Where coke or charcoal is used, it may be about eighteen inches square; but where small coal, turf, or peat is to be burnt, it should be two feet, or even two and a half, square, by two feet in height. A large furnace insures the long continuance of the fire, a fact which in practice has received too little attention. To resist the effects of heat, the interior should be lined with fire-brick. The roof should be strongly arched. The door may be about a foot square, and when it is double, as it ought always to be, the outer half should be a little larger than the inner. The grate is of the same breadth as the door, and may extend about two-thirds of the length of the furnace. The ash-pit is equally wide, and from fifteen to eighteen inches deep; it is furnished with a ventilator in the door to regulate the admission of air. In practice the furnace, and especially the ash-pit, should be kept clear of ashes; as by this means coals of an inferior quality may be burnt with ease.

Fig. 13 represents a longitudinal section of the common garden furnace. It is surrounded by a double wall to prevent the escape of heat.

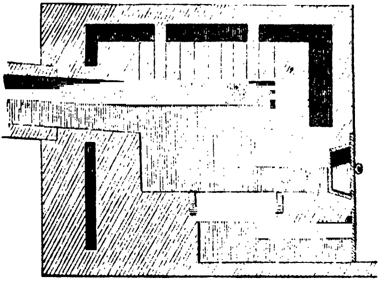


Fig. 13.

Mr Witty has invented a furnace, which is possessed of valuable qualities. A vertical section of it is given in fig. 14. The fuel is supplied by the door at *a*. and is pressed down the inclined plane towards the grate *c*, by an apparatus placed at the head of it; but this method being complicated, has given way to several modifications, in which the door *a* has been found the most useful, the fuel being pressed forward by the common tools used for feeding furnaces:

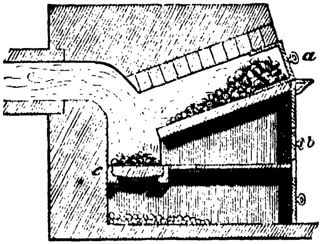


Fig. 14.

b is the door for regulating the fuel on the grate *c*. In its progress, the whole surface of the coal along the inclined plane is constantly kept in a state of inflammation, the flame having naturally a tendency to burn upwards. In this way the greater part of the fresh coal is carbonized, that is, the gas is separated from it and inflamed, leaving only coke. The strong combustion of the coke at the grate produces heat enough to carbonize the coal, and air enough to inflame the gas. This furnace, therefore, not only consumes most of the smoke, but effects a considerable saving of fuel.

Steam.—Steam is more genial than fire-heat from flues, being less contaminated, and more equable and pliant in its distribution. In steam hothouses the plants can scarcely ever be liable to suffer from scorching heat; the air continues pure and untainted, and persons visiting the house are much less liable to be annoyed by the smell of smoke and soot. It is neater in all its arrangements within doors and also without, for it precludes the necessity of more than one furnace and one chimney top, and in a great measure removes the unseemliness of the heaps of coals and ashes with which common furnaces are usually surrounded. In districts where coals are dear, the saving of fuel is an object; and it has been found that seven bushels of coals go as far in keeping up steam heat, as ten bushels do in maintaining an equal temperature by flues. By merely opening a valve, the house may at any time be effectually *steamed*, that is, filled with the steam or vapour, and the warm moisture thus applied to the plants is observed to contribute remarkably to their health and vigour. To counterbalance these advantages, we are not aware of any defects, except such as may arise from the greater complexity of the apparatus, or at least its liability to disrepair and accident.

Steam is generated in a cast or wrought iron boiler, furnished with safety-valves, and heated by a furnace. As in the common steam-engine, the boiler is supplied from a cistern above, and is made to regulate itself by a simple contrivance. In the feed-head is a valve, which is opened by the sinking of a float, which descends in proportion as the water is dissipated in steam; and, being balanced by a weight, whenever a sufficient quantity of water is admitted, rises again, and shuts the valve. As steam may be conveyed, without materially impairing its calorific powers, to the distance of several thousand feet, one boiler is sufficient for heating all the glazed houses which are ever erected together; but a second is generally kept in readiness, to act as an auxiliary in case of accident, or in very severe weather. Steam is conducted from the boiler in a single main pipe, or in two parallel pipes, which may be only one inch in bore. The divarications of the pipes into particular houses are arranged somewhat in the manner of flues, and, indeed, are sometimes placed within or on them, when they already exist. These interior pipes are from three to six inches in diameter, in order to afford a greater radiating surface, and are supplied with sets of valves, to admit, regulate, or exclude the heated vapour, according to circumstances.

In small greenhouses a single steam-pipe is found sufficient; but in houses of considerable height and breadth, or where a higher temperature is required, as in the palm-house, the steam-flue is made to describe two or three turns.

Water, contained in large vessels or pipes, is sometimes heated by steam, and so made the medium of conveying caloric to the atmosphere of glazed houses. The annexed fig. 15 represents an example of this arrangement. In the instance here given, a small steam-tube, one inch in diameter, enters a water-pipe eight inches in diameter, and twenty-eight feet long, wholly within the forcing-house; it passes into the larger pipe at the centre, and after traversing its whole length and returning, it issues out immediately below the point at which it entered. It then forms a syphon, by which the condensed water is conveyed away. A more detailed description may be found in the *London Horticultural Transactions*, vol. iii.

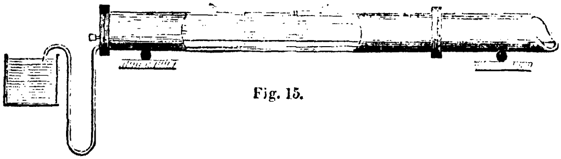


Fig. 15.

Steam is sometimes employed to furnish bottom heat. A shallow cistern of water is heated by a steam-pipe, in the manner exhibited in figs. 16 and 17. The cistern is covered with pavement, over which is a bed of small stones, then ashes or sand, into which the pots containing plants are to be plunged.

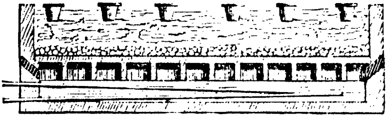


Fig. 16.

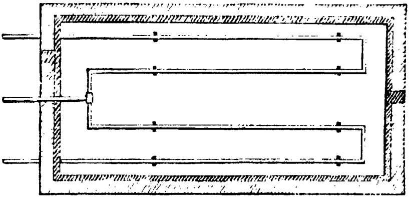


Fig. 17.

Steam is also employed to heat flues. Fig. 18 represents a side view and section of a flue filled with small stones or broken bricks, and heated by means of a small steam-pipe passing along the lower part of the flue. Along the upper side of this pipe are a number of small holes, becoming more frequent towards the farther end, to allow the escape of steam; there are, besides, a few perforations in the under side, to clear away condensed water. The flue has a slight

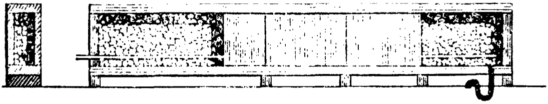


Fig. 18.

inclination to that end of the house from which the water can be more easily drained.

Similar expedients were long ago employed, in the heating of forcing-pits, by John Hay of Edinburgh, a garden-architect of great judgment and experience. The subjoined figs. 19 and 20 represent a mode of supplying

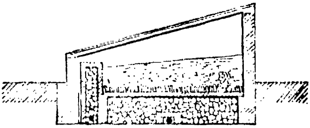


Fig. 19.

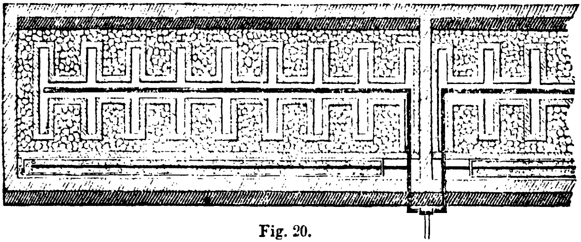


Fig. 20.

surface and bottom heat, by discharging steam into flues and chambers filled with stones. The steam is admitted by small pipes running along the central pit, in channels about four inches deep, and of the same width. These channels are crossed by others at right angles; and at the points of intersection the steam is permitted to escape by two small holes, one on each side of the pipe. The pits must have a water-tight paved bottom, with a declivity of one inch in ten feet. The sides and covers of the channels are loosely jointed, and are permeable by the steam. Stop-cocks are attached to the pipes, so that the supply of vapour can be adjusted.

Another mode of adapting steam to the production of bottom heat, may be seen in Mr Macmurtrie's Pine-Pit, to be afterwards described.

Hot Water.—More recently the circulation of hot water in iron pipes or vessels has been successfully employed in producing artificial warmth. The temperature derived from this source has all the properties of steam-heat, with the following additional advantages: it is more steady, being less affected by changes of temperature in the open air than in houses heated by fire-flues, or even by steam-pipes; it is not liable to interruption by the bursting of vessels, and it is more lasting, as water does not cool so rapidly as aqueous vapour.

The following explanation of the principle of the hot-water apparatus is given by Tredgold, in the *Lond. Hort. Trans.*, vol. vii.: "We may select the simple case of two vessels placed on a horizontal plane with two pipes to connect them; the vessels being open at top, and the one pipe connecting the lower parts of the vessels, and the other the upper parts. If the vessels and pipes be filled with water, and heat be applied to the vessel A, the effect of heat will be to expand the water in the vessel A; and its surface will, in consequence,

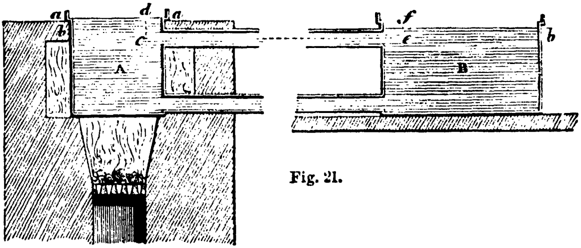


Fig. 21.

rise to a higher level *a*, *a*, the former general level being *b*, *b*. The density of the fluid in the vessel A will also decrease, in consequence of its expansion; but as soon as the column *c*, *d*, of fluid above the *centre of the upper pipe* is of greater weight than the column *f*, *e*, above that centre, motion will commence along the upper pipe from A to B, and the change this motion produces in the equilibrium of the fluid will cause a corresponding motion in the lower pipe from B to A; and, in short, the motion will obviously continue till the temperature be nearly the same in both vessels; or if water be made to boil in A, it may also be boiling hot in B, because ebullition in A will assist the motion."

Fig. 21 referred to in the preceding quotation, representing the common tank boiler surrounded by a flue, with a cistern at the extremity of the pipes, exhibits the form in which the apparatus was first erected; but as in this arrangement the process of heating was very slow, many changes have been made; the cistern has generally been abandoned, and boilers of various configurations have been adopted. Fig. 22 is a longitudinal section, and Fig. 23 is a transverse section of a flued tank

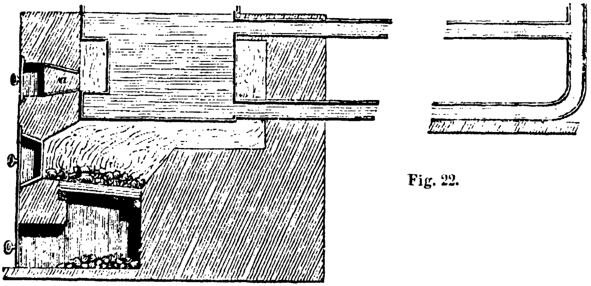


Fig. 22.

boiler, in which the surface exposed to the heat being increased, the effect required is accelerated, and at the same time a considerable saving of fuel is effected.

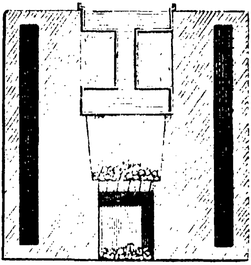


Fig. 23.

The conical boiler, invented by Mr Rogers, of Sevenoaks, Kent, is formed of two truncated concentric cones, with a space of two or three inches between them for the water, the furnace being in the inner cone, and the fuel supplied from the top.

Mr Rogers' boiler was originally surrounded with brick-work, but several modifications and improvements of it have been introduced: in some cases it has been fitted up in a sheet-iron case, like Arnott's stove. In fig. 24, the boiler is placed in a cast-iron stand,

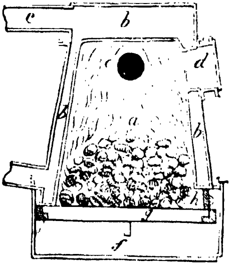


Fig. 24.

with ground circular furnace, and register ash-pit doors,—*a* being the furnace, *b* the boiler, *c* flow and returning pipes, *d* the furnace door, *e* smoke-pipe to the vent, *f* ash-pit, *g* grating, *h* hole for cleaning the furnace. The best kinds of fuel for this furnace are coke, gas-cinders, and anthracite; but common coal which does not cake very much has been found to be well adapted for the purpose, as it is soon formed into coke.

The following is the *rationale* of the process of the heating of this boiler, as given by Mr Rogers in the volume of the *Gardener's Magazine* for 1840.

"As fuel cannot be consumed without air, if a furnace be constructed of considerable depth, and filled with fuel, and air be admitted only at the bottom, that fuel alone is consumed which lies immediately on the bars, and first receives the draught of air. The fuel above, provided it transmits the air, becomes red hot, or nearly so, but does not consume until that below it is destroyed. In this manner, one of these conical furnaces being lighted and filled with fuel, that portion in the upper part of the furnace which cannot burn absorbs the heat of the burning fuel below, and radiates or transmits it to the water on every side. So perfect is this absorption of heat, that for several hours after the furnace has been filled up with cinders, though there may be a fierce fire below, little or no heat escapes by the chimney—the whole being taken up by the surrounding water. The economy, therefore, of fuel in such an apparatus is very great. It is evident, that excess of draught must be carefully guarded against, so much only being allowed as will consume the fuel steadily, which is easily learned by experience. The necessity, also, of keeping the aperture in front close, so that air enters the furnace only through the ash-pit, is hence evident. The water (as may be observed from the above figure) is in close and immediate contact with the red-hot fuel on all sides, no black smoking coals intervening, as in most kinds of boilers; hence the great power in proportion to size."

The economy of fuel in these boilers is not their principal advantage; their great recommendation is a long-continued and steady heat. When properly managed, they may be depended on for preserving the heat for from fifteen to twenty hours. They have been successfully applied to all descriptions of hothouses, but for pits they are eminently useful, from the small space they occupy; and when fired with coke, gas-cinders, or anthracite, they give off very little smoke.

It is unnecessary to describe all the numerous modifications of this apparatus; but it may be proper to direct the attention of the reader to the close boiler

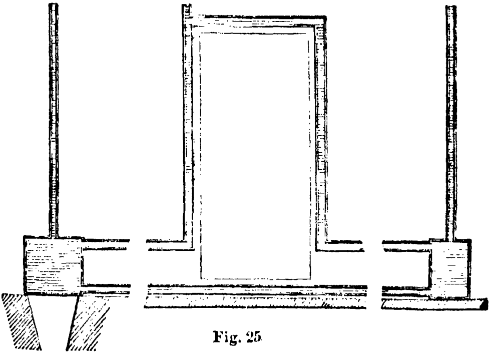


Fig. 25

represented in fig. 25, in which is shewn how the circulation may be conducted over a door or other obstacle. In this case the upper pipe must not ascend and descend twice: air-tubes ought also to be placed in the boiler, and on the highest part of the pipes; and the whole must be made considerably stronger than on common occasions. The annexed isometrical elevation, fig. 26, will give an idea of a hot-water apparatus for a vinery thirty feet long by eleven wide. A is the boiler, as in fig. 21, p. 135; B the upper or delivering pipe; C the principal part of the upper pipe, of a flat form, presenting a greater radiating surface, in proportion to the quantity of heat; D the descending limb; E the returning pipe, of a cylindrical form.

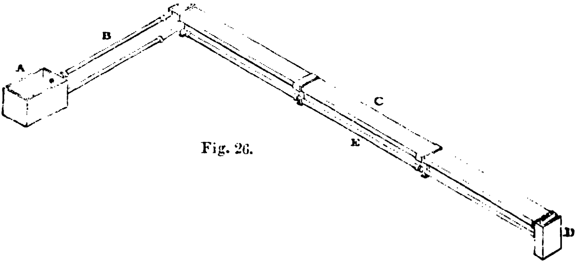


Fig. 26.

Mr Fowler has employed the syphon as a part of the hot-water apparatus; and in his tract on the *Thermo-syphon*, as he calls it, has shewn how its various modifications may be employed in warming hot walls, as well as in heating glazed houses. The following statement of the principle is given in the *Gardener's Magazine*, vol. v.: " Any one may prove that hot water will circulate in a syphon, by taking a piece of lead pipe, say of half an inch bore, and four or five feet long, bending it like a syphon, but one leg a good deal more bent than the other, in order to give the descending water time and space for giving out its heat; and then, filling this tube with water, and placing one hand on each end to retain it full, immerse the extremities in a pot of water over a fire, as represented in the annexed fig. 27. Supposing the water of a uniform temperature in both legs of the syphon, no circulation would take place; but supposing it to cool sooner in the long leg *a* than in the short leg *b*, then the equilibrium would be destroyed, and the water in the long leg *a* would descend, and draw up water through the short leg *b*; and this circulation would continue as long as the water *c* was maintained at a temperature above that of the surrounding atmosphere."

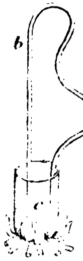


Fig. 27.

Mr Kewley's adaptation of the syphon is one of the simplest and most efficient that has been proposed. In fig. 28, *a*, *c*, *c*, are the two legs of a syphon, through the upper of which the heated water ascends, and by the lower descends. Immediately over the descending bend, a pipe connected with an air-pump is inserted, in order to fill the pipes, or remove the air which collects in the superior limb. Instead of the air-pump,

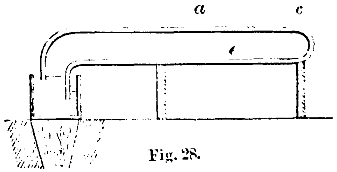


Fig. 28.

a funnel with air-tight valves is sometimes employed. This mode of circulation has been adopted in some of the principal nursery-gardens near London.

The system of heating by the circulation of hot water in metallic pipes, is easily applicable, not only to any glazed house constructed with flues, but to any select portion of an existing fruit-wall, although already clothed with trees. In the last case, a small furnace and boiler are, of course, placed at the back of the wall; the expanding water rises to a cistern near the top of the wall; horizontal pipes, making three or four turns, are inserted into the south front of the wall, which is an easy operation, as the wall is usually faced with brick; and through these the water circulates, to the great increase of the temperatnre of the air surrounding the tree. The operation should be accomplished late in the autumn; the tree being carefully unnailed, bent forward, and secured from injury or breaking, and as carefully replaced.

Mr Perkins has constructed an apparatus of small tubes hermetically sealed, in which water circulates, of a temperature varying from 300° to 400° Fahrenheit. The contrivance is very ingenious, and has been pretty extensively employed, at London and Edinburgh, in heating public offices and warerooms. For further information we may refer to the *Gardener's Magazine*, vols. viii. and ix.; and to Mr M'Intosh's *Book of the Garden.*

Mr Corbett, foreman at Pontey's nursery-garden, Plymouth, introduced a mode of employing hot water as a means of heating. From a common boiler proceeds an upright tube, and this tube leads to a continued series of open gutters. Heat being applied to the boiler, the water rises in the tube and flows forward in the gutters, giving out moisture in proportion to the degree of heat. As the water cools or becomes more dense or heavy, it gradually falls back to the bottom of the boiler.

Mr Rendle, of Plymouth, has also introduced a mode of heating, in which he employs tanks instead of pipes, or gutters, for both surface and bottom heat. These tanks are formed of wood, brick, stone, or cast iron. When formed of wood, they require to be made of good sound plank, not less than two inches thick, properly jointed, and are usually covered with slates. If they are formed of stone or brick, the insides require a thick coating of Roman cement, and for covers, stone, slate, or brick pavement is employed. The cast-iron tanks have corners of the same materials.

When only one tank is fitted up in a house or pit, a division is made along the centre, leaving an opening at the end farthest from the boiler, for the water to flow through, the hot water or flow pipe from the boiler being fixed to the end of the tank on one side of the division, and the cold water or return pipe to the boiler to the end, on the opposite side of the division. When two tanks are used, they are joined to the flow and return pipes respectively, and united at the extreme ends. In pits, the tanks may be carried round the sides and ends of the pit, with a division between the flow and return pipes.

The principal advantage of the application of this mode of heating consists in the production of bottom heat. Proper provision ought, however, to be made for preventing more of the steam or vapour rising from the hot water (into the house) than what is requisite; for, if this precaution be not adopted, there will be too much damp in the winter season for the proper growth or preservation of the plants.

To mention *the rays of the sun* amongst the sources of artificial heat, may excite a smile; yet it happens that, from the stagnation of air, the reflection of light from walls, and other circumstances, they often produce a very considerable proportion of the increased temperature of a hothouse. This species of heat, however, is materially affected by the admission of the air necessary to the growth and healthy state of the plants. We are not aware of its having been employed as a primary source of heat, except in the case of Dr Anderson's patent hothouse, in which heated air was kept, bottled up, as it were, in separate chambers; an arrangement too irregular and unmanageable to be of much utility in our variable climate.

Vegetable substances in a state of fermentation evolve a considerable quantity of caloric, and are much employed to produce *bottom heat* in hotbeds, pine-apple, or melon pits. In a few instances they have been applied to warm the atmosphere of vineries and peach-houses, in which, however, they have been found to be but an indifferent substitute for the other means already explained.

In the management of artificial heat, a considerable degree of caution is required. All the operations of nature are gradual; and in *forcing*, it is well to follow these as the safest examples. The judicious gardener will therefore apply his heat very gradually at first; he will increase it by degrees for several weeks, and, in particular, he will guard against any sudden decrease of warmth, as nothing is more necessary to success than that the course of vegetation be continued uninterruptedly through foliation, inflorescence, and fructification. He will cause the temperature to increase by day and decrease by night, to rise in summer and fall in winter. He will, in short, imitate, as much as possible, the natural and varying influence of the sun.

It is scarcely necessary to say that a Fahrenheit thermometer is an indispensable instrument to the gardener, not only in the forcing-house, but in every department. Six's Registering Thermometer is very convenient, for pointing out the extreme temperatures during night or day.

The Admission of Air.—The deteriorating influence which all living plants are supposed to exert on the atmosphere, must operate with tenfold force in a glazed house, where the proportion of air to vegetable substance is infinitely smaller than under the open sky, and where the corrective agitations of the wind, and the changes of temperature, are much less perceptibly felt. The respiration of plants, and the exhalations of putrescent vegetables, require a constant circulation of the aerial fluid, and this is maintained by means of moveable sashes and ventilators in the roof of the house. Of these, sashes seem preferable, as less apt to produce currents of cold air, which are always injurious to vegetation. It is, indeed, a disadvantage that, by sliding down over one another, they diminish the influx of light. In winter, however, when light, from its scarcity in our high latitude, is most valuable, they are seldom drawn down to any extent; and, by having all the sashes moveable, the gardener, with a little attention, may correct, in a great measure, any inequality in this respect. Sliding sashes require a depth of rafter which greatly augments the shade in oblique sunshine, an evil which cannot easily be obviated. With fixed roofs, and more especially those which are curvilinear (to be immediately described), numerous ventilators are the only means by which a proper circulation of air can be obtained. Some very intelligent gardeners prefer having all the sloping sashes fixed, and ventilating chiefly by means of large windows at each end of the house, aided by small ventilators in front.

The quantity of air to be admitted from time to time must vary with the season, the temperature required to be kept up, and the kinds of plants cultivated. It should be given and withdrawn by degrees, particularly in the colder portions of the year. The sashes or ventilators, for instance, may be partially open by eight A.M., top air being given before front air; full air may be employed about ten: a reduction should take place before three P.M., and the whole should be closed between four and five in the afternoon. In summer less caution is necessary, as in many cases the external air differs little in temperature from that within the house. Most commonly, air is given only during the day, and is excluded at night, with perhaps an increase of fire-heat. Judicious horticulturists will sometimes reverse this process. Knowing, for example, that in the West Indies chilly and cold nights usually succeed the hottest days, they will imitate nature, by shutting up the house by day, and throwing it open at night. This practice, however, supported as it is by analogy, is subject to many limitations, and can only be followed in our climate during the summer and autumn months. It is useful, notwithstanding, to remember the principle, though it admits only of partial application.

The Admission of Light.—In addition to the heat with which natural light is always accompanied, there seems to be another property necessary to vegetation, which, from some cause hitherto unexplained, is partly deranged by its transmission through glass. The fact, however, is evident, from the circumstance that plants thrive better near glass than at a distance from it, though the intensity of light is apparently undiminished. Hence practical gardeners are anxious to distribute their finer plants in situations as close as possible to the glazed roofs of hothouses.

Connected with the admission of light, is the determination of the pitch or angle of elevation of the roofs of glazed houses. It is evidently of advantage that the rays of light should fall upon glass perpendicularly, as loss by reflexion is then a minimum, or indeed little or nothing. The angle necessary to obtain this result is easily deducible from the sun's place in the ecliptic. At the equinoxes, the sun's meridional height above the horizon at any point of the earth's surface, is equal to the complement of the latitude of that place: and hence, in order that the sun's rays may be perpendicular at that period, it is only necessary to make the elevation of the roof of the hothouse equal to the latitude of the place. The angle, for any other season, may be obtained by subtracting from the latitude the declination of the sun, if at that time to the north of the equator, or by adding it, if to the south.* These periods are of course selected in accordance with the time at which the direct rays are most required. Mr Knight proposes a general elevation of 34° for the latitude of London, an angle which corresponds to the 20th of May and 21st of July. This would afford four months, from the 20th of April to the 21st of August, during which the angle of incidence at mid-day would not at any time amount to 9°, while the deviation at the winter solstice would be 43°, and the loss of light from reflexion would be little more than $\frac{1}{30}$. The Rev. Mr Wilkinson recommends 45°, a pitch extremely suitable for early vineries and pine-stoves. In this case, the midsummer deviation would be 19°, and the loss $\frac{1}{40}$, and the midwinter deviation 30°, while the loss is nearly the same. From these statements, however, and from an inspection of the table already referred to, it is manifest that much greater exactness has been sought in this matter than is at all necessary. The reduction of the opacity of the roof, arising from the breadth and depth of rafters and astragals, is of much greater con-

---

* The following is part of Bouguer's Table of Reflexions.—Of 1000 incident rays, when the

Angle of incidence is	75°	299 rays are reflected.
	70	222
	65	157
	60	112
	50	57
	40	34
	30	27
	20	25
	10	25
	1	25

sequence. Accordingly, in some glazed houses, particularly those constructed of metallic substances, rafters have been omitted altogether; but this kind of structure leads to considerable difficulties in the admission of air.

We have taken it for granted that the framework is composed of wood; and if prime Baltic timber be procured, it will endure for nearly half a century. But in some cases rafters and sashes made entirely of metal, generally either malleable or cast iron, have been employed; and in others, a middle course has been taken, by adopting wooden mortices and metallic tenons. The great objection to the use of metal for rafters and sashes is, that it is too rapid a conductor of caloric, and too liable to contraction and expansion from the alternations of heat and cold; the expansion tending to render the sashes immoveable, and even to loosen the walls; and the contraction being apt to fracture the glass, and to produce openings between the sashes at which hoar-frost may enter.

In order to secure the greatest possible influx of light, scientific horticulturists recommend hothouses with curvilinear roofs. It was remarked by Sir George Stuart Mackenzie, to whom the merit of the proposal is primarily due, that if we could find a form for a glass-roof, such that the sun's rays should be perpendicular to *some part of it*, not on two days, but during the whole year, that form would be the best. Such a figure is the sphere, and he therefore proposes a quarter segment of a globe, or semidome, the radius of which is about fifteen feet. The frame for the glass-work is formed of equal ribs of hammered iron, fastened into an iron plate in the parapet wall, and fixed at top into an iron ring connected with the back wall. There are no rafters or sliding sashes, but air is admitted by ventilators in the parapet and back walls.

This form of hothouse roofs was warmly patronised by the late Mr Knight, who, however, was of opinion, that the house proposed by Sir George Mackenzie was too high, in proportion to its length and breadth, and therefore recommended a smaller section of a sphere, with a greater radius. His dimensions are forty feet long, fourteen wide in the centre, and, including the front parapet, twelve feet high. The late Mr Loudon, who, it is believed, was the first that actually erected hothouses on this principle, proposed several sub-varieties of form. He describes in his "Encyclopædia of Gardening," the *acuminated semidome*, the *acuminated semiglobe*, the *semi-ellipse*, and the *parallelogram with curved roof and ends*.

As far as we are aware, no extensive experimental investigation of the *comparative* merits of curvilinear houses has hitherto been made. A writer in the Gardener's Magazine (vol. ii.) states, that he found it necessary, during the summer months, to shade his pine-apples growing in such a house, from nine or ten o'clock in the morning, to three or four in the afternoon, in order to prevent the plants from assuming a rusty tinge, and unhealthy appearance. Another practical gardener complains (vol. v.), that "the circular roof concentrated the sun's rays so immoderately, that the tops of the grape vines were scorched, even when the doors and ventilators at the back were open." This, he says, was always the case in summer; and in winter it was with difficulty, and only with the assistance of bast-mats, that he could keep out frost. With others, however, the curvilinear form has given great satisfaction. A considerable portion of the superior lightness of the curvilinear houses is due to the absence of rafters; and as these may also be dispensed with in plain roofs, the effect of these ought to be deducted in making a comparison. Perhaps, when every thing else is rightly arranged, there is generally enough of light in common houses. Scarcely any species of fruit, when cultivated in the open air, is exposed during the whole day to the action of the solar rays, but must unavoidably be shaded at times by leaves and branches. It is difficult to suppose that, in respect to illumination, there is any remarkable deficiency in pits and glazed houses, in which have been ripened pine-apples and clusters of grapes, at least rivalling, if not surpassing, the produce of the most favoured of their native climes. In the facility of admitting air, in the quantity and convenience of trellises, and in other interior accommodations, it cannot be disputed that the old forms have rather the advantage.

It has already been said, that hothouse roofs of the common kind are sometimes constructed without rafters or moveable sashes. A considerable increase of light is thus obtained; but this benefit is attended with an almost insuperable defect, namely, the difficulty of producing a free and equable circulation of air. It is indeed probable that the common or plain-roofed hothouse will always continue the favourite form with practical gardeners In it the rafters are arranged at equal distances, and are made of a deep and narrow form, with their under edges rounded off. Nicol recommends that they should be made two and one-fourth inches broad, by ten inches deep. Perhaps they might be a little broader and shallower with advantage. The size of the sashes may depend on the magnitude of the house; their breadth, however, should range from three and a half to four feet. Except in very large houses, sashes are always disposed in two tiers, the upper row sliding down over the under one. Where there are ventilators in the front wall or upright glass, the sashes in the upper tier alone require to be moveable, and, for the sake of convenience, they should be made considerably shorter than the others. They are furnished with cords, pulleys, rollers, and weights, though the last, with no very prudent regard to economy, are sometimes omitted. Formerly all hothouses were constructed with upright sashes in front, but they are very seldom used now; and, except in ornamental structures, it is hard to say why they should not be laid aside altogether; for while upright sashes certainly tend to weaken the fabric, and increase its expense, their utility is at least problematical.

Glass is the transparent material universally employed, for it is at once a ready transmitter of the rays of the sun, and a bad conductor of caloric; or it admits light, and retains the heat generated in the house by hot water, or otherwise. That some tint of blue or green would lessen the scorching effects of the sun's rays, has for some time been admitted; but it was not until the erection of the large conservatory at Kew, that the question was satisfactorily determined, under sanction of the Commissioners of Woods and Forests, by Mr Robert Hunt, of the Museum of Practical Geology, who found, after a series of experiments, that a glass coloured of a pale yellow green, by means of oxide of copper, afforded the most satisfactory results. The panes of glass formerly employed in hothouses were of large size, but small panes are found to be more economical, being less liable to break, and more easily replaced. It is believed that a pane seven inches in breadth by six in length, is the cheapest form in which good glass can be obtained. In glazing, it is important to keep the overlaps of the panes of small dimensions, perhaps from one-fourth to one-eighth of an inch in breadth. This diminishes the breakage which arises from the expansion attending the freezing of water detained between the laps by capillary attraction. As a further preventive, the interstices are sometimes filled with putty, and occasionally with laps of lead or copper. This effects a considerable saving of glass and of heat, but imposes on the gardener the duty of increased attention in preventing the stagnation of air. The framework of hothouses should be well coated with oil-paint; white-lead of a stone colour being preferred.

In closing these preliminary remarks, it is proper to observe, that although the construction of a forcing-house, is always a matter of considerable importance, it is not the only, nor even the most important condition necessary to insure success. Much care in management, skill in pruning, and some knowledge of physiology, must be possessed and applied, in order to obtain abundant and regular crops of fine fruit.

The more minute details respecting the structure of glazed houses, we shall notice along with the peculiar culture required in each; and we shall take them in the following order; 1, The Vinery or Grape-house; 2, Peach-house; 3, Cherry-house; 4, Fig-house; 5, Orangery; 6, Pinery; and, 7, Melonry. The Green-house and other botanical structures will come more appropriately under review in treating of the Flower Garden.

1. THE VINERY.

Structure.—The vinery is susceptible of a great variety of form; more so, indeed, than any other forcing-house. That form, however, which has been most commonly used, is the plane roof with sliding sashes; and such is the success with which it has been employed, and its convenience for every purpose, that it is not probable it will soon be generally supplanted. The section of the peach-house at page 163 will give an idea of the usual configuration of the vinery. On the opposite page are given a section and a ground plan of a curvilinear vinery (having a mushroom-house behind), heated by hot water.

A vinery, with flues and two furnaces, is generally fifty feet long, twelve or fourteen wide within, the height of the back wall being ten or twelve feet. Where there is only one surface, or where a hot-water apparatus is employed, the length of the house should not exceed thirty-five or forty feet. Small divisions are to be preferred; for where there is a considerable extent of glass, the cultivator, by applying his fires to the different divisions in succession, can prolong the crop from May to December. The parapet wall in front is commonly arched, or built on lintels, supported by stone pillars;

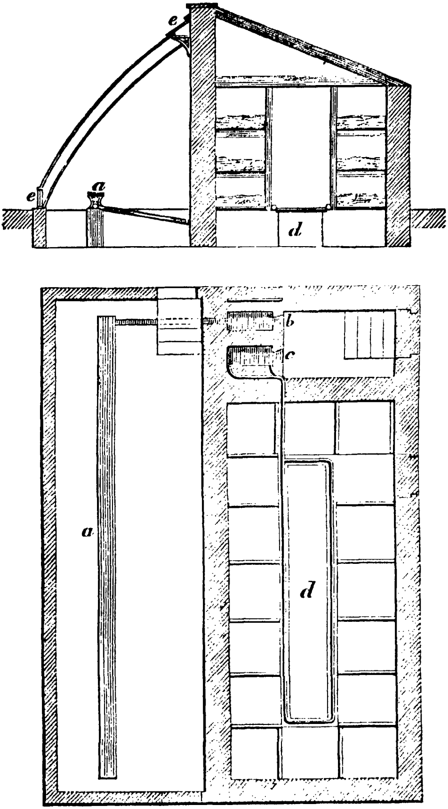


Fig. 29.

a, Hot-water apparatus in the vinery.
b, Boiler for the vinery.
c, Boiler for the hot-water apparatus of the mushroom house.
d, Pit below the passage of the mushroom-house for forcing rhubarb, sea-kale, &c.
e, Ventilators for the vinery.

so that the vines, which are planted inside the house, close by the parapet, may send abroad their roots in search of nutriment. Sometimes the vines are planted without, and introduced into the house by slanting apertures in the front wall; but the former method, where possible, is the more eligible. The trellis used for training is generally formed of wires drawn across the rafters, at the distance of a foot from each other. Of late the trellis has frequently been divided into portions of a moderate breadth, placed vertically under the rafter. This form is called the hanging trellis, and is described at length in the *Lond. Hort. Trans.*, vol. vi. A section of one variety has this appearance.

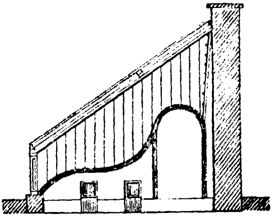


Fig. 30.

This form leaves the middle of the sash open to the sun's rays, and allows the back wall to be covered with bearing wood, a thing which, in other circumstances, can scarcely be done with any beneficial effect. It must, however, be admitted, that, according to the experience of some, this arrangement is inferior to the common trellis.

It is of importance that the included soil and front border of a vinery should be fresh and rich, and of a considerable depth. Mr Griffen (in *Lond. Hort. Trans.*) recommends as a compost "one-half of good loamy soil with its turf, one-quarter of rich old dung, and one-quarter of brick and lime rubbish; the turf well rooted, and the whole well incorporated." Plants raised from cuttings, and prepared for two or three years in pots, are preferred for the furnishing of a vinery; and when planted inside the house, there should not be fewer than two plants to each sash.

It is scarcely necessary to enumerate the particular varieties of the grape-vine, as adapted for a vinery, for every good variety deserves a place where there is room, and all those which have been already mentioned are occasionally employed. It may be remarked, however, that the kinds should be assorted according to the order of their ripening. The early grapes, such as the Muscadines, should be planted in a house by themselves; those of a medium character, the Frontignacs and Black Hamburgh, for example, may occupy a second; while the late Tokay, the Muscat of Alexandria, Nice, Syrian, and others, would be fit inmates for a third. This would produce a regular succession, and admit a uniformity of treatment in each house. Where there is not a suite of vineries, but only one large house, the late varieties should be placed near the entrance of the flues, where the temperature is higher.

Pruning and Training.—Very numerous have been the directions given in reference to these particulars; but we cannot here go into such details, nor is it necessary. The great object is the reproduction of bearing, that is, annual wood, over the whole surface of the house. When this is accomplished, the next matter to be determined is the number of eyes or buds to be left on each shoot, that is, whether we shall adopt the *short* or the *long* system of pruning. The former is most allied to the practice of foreign vineyards, and has been most successfully employed in this country. According to this method, all the lateral shoots are cut down to single eyes, as described in *Lond. Hort. Trans.*, iv., p. 104. For a particular description of the *long* system, we may refer to the same volume, p. 246, or to Loudon's Encyclopædia of Gardening, second edition, p. 548. To these references, we shall only add a few general remarks. (1.) In this country, it ought to be the great aim of the gardener to make his vines grow as luxuriantly as possible; for the good quality of the grapes, when properly ripened, is generally commensurate with the strength of the shoots and size of the berries. The borders should therefore be made rich; but they ought to be rather wide than deep, deep planting being adverse to the ripening of the fruit. (2.) In order to secure a proper degree of vigour, vines should be limited in extent and pruned during winter, rather severely than otherwise. To enable us to circumscribe the plants, it would be well to introduce as many separate plants into the vinery as can be done without confusion. For an illustration of this principle, we may refer to the practice of the *vignerons* of Fontainebleau, as described in the *Pomone Française*, or in the *Lond. Hort. Trans.*, vol. vii. (3.) From the peculiar mode of growth in the grape-vine, the bearing branches have a tendency to recede from the centre to the extremities, and are often found in abundance only at the top of the trellis. Every young shoot near the front of the house should therefore be carefully husbanded, and cut back by way of reserve. Old wood ought to be removed as frequently as possible; and the skilful pruner will look at least two years before him. Nothing contributes more to regularity in the succession of bearing wood, than simplicity in pruning and training; and, therefore, all bending, and twisting, and traversing of branches should be avoided.

The summer pruning consists in removing with the fingers useless lateral shoots, and especially buds not producing shoots, and in pinching off the tender points of the bearing branches. The extent to which these bearing branches may be allowed to run must depend on their vigour, and the position which they hold in the plant. Sometimes it may be needful to leave them ten or twelve feet long, but, in general, two or three feet will be sufficient. The shorter the better. They seldom or never fail to send out secondary laterals from their points: these and the others which succeed them are stopped at the second or even first eye, and the operation is continued until vegetation ceases. When the young grapes begin to swell, the clusters are thinned out, that is, berries are removed whenever they are too much crowded together, and the shoulders or sides of the bunches are supported by means of slender threads of bast-mat attached to some fixed point above. The quality and weight of clusters should be regarded rather than their number. Nothing seems more contemptible than numbers of small and ill-ripened bunches of grapes, smeared, as they often are, with dust and honey-dew. Avarice not unfrequently cheats itself in this matter; and it generally happens in the vinery, as elsewhere, that not he who desires most obtains most. The ripening, colour, and flavour of grapes on the tree are said to be promoted by removing a portion of the foliage. This is to be done, however, only after the fruit has attained full size; and by some it is, with apparent justice, alleged that the foliage ought never to be abridged. If it be abundant and exposed to the sun, the grapes will come to perfection although shaded by the foliage. Sometimes the berries, when swelling, seem suddenly arrested in their progress to maturity, and remain stunted and shrivelled. This affection is called *shanking* by gardeners, and is generally ascribed to damp and noisome vapour, or the want of due circulation of pure air.

The grafting of the grape-vine with detached scions, as introduced by Mr William Gowans, gardener at Calder House, near Glasgow, may be here noticed, as it has been found perfectly successful, and very convenient, by some of the most distinguished practical horticulturists in this country.

The distinctive feature of the method is, that it avoids the usual mode of grafting vines by approach, with all its inconvenient restraints, and substitutes a simple scheme of grafting by detached scions. The following are the directions given by Mr Gowans, which will be rendered plain by the annexed sketch, fig. 32:—"Select a scion with one eye, and cut it in the form of a wedge. For a stock, select a shoot *b* of the preceding year, about the same thickness as the scion, and cut it over a little above the second eye from the old wood. With a sharp knife cut it down the centre nearly to the old wood. Out of the centre, pare with a penknife as much as is necessary to make it fit the cuts on the side of the scion. Then insert the scion *a*, with its eye opposite to that on the top of the stock. Tie it up and clay it over in the usual manner, with this difference, that you cover nearly the whole of the scion with the clay, leaving only small holes for the eyes. Tie some hypnum-moss upon the clay, upon which sprinkle a little water occasionally, to keep the whole in a moist state for some time. What is of essential importance to success in this method, is the leaving of the eye or young shoot on the top of the stock, and allowing it to grow for ten or fourteen days, when it should be cut off, leaving only one eye and one leaf to draw sap to the scion, till it be fairly united to the stock. With regard to the time of grafting, it will succeed pretty well when the stocks are about to break into leaf. But there is more certainty of success when the shoots of the stock have made four or five eyes of new wood, for by this time the sap has begun to flow freely, and the danger of bleeding is over.

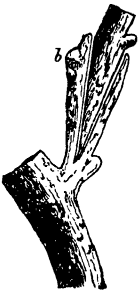


Fig. 32.

It is evident, that by this mode of grafting vines, many different kinds of grapes may be tried in the course of three or four years, even in a very limited vinery, and the best and most successful retained in cultivation.

The forcing of the earliest vinery may commence in January. At first the temperature may vary from 50° to 55° Fahrenheit in the mornings and evenings. When the buds have burst, it may be raised to 70°, and in the flowering season it may be kept at 75°. At this period

2. THE PEACH-HOUSE.

A peach-house, intended to be commanded by one furnace, is generally about forty feet long, ten or twelve feet wide, and fourteen feet high; but these dimensions may be varied considerably, according to the time at which the crop is desired to come in. For early forcing, perhaps twenty-five or thirty feet in length, and seven or eight in breadth, are sufficient; while a house in which the operations of nature are only to be slightly accelerated, may be extended to fifty feet. As in the vinery, the fruit wall is arched, to permit the egress of the roots to the neighbouring border. Upon this front wall is usually placed a range of upright sashes, which are surmounted by the sloping rafters of the roof. A common form of a peach-house is annexed, figure 33 shewing the vertical section, and figure 34 the ground plan; *a*, *a*, are the flues or hot-water pipes, *b* is the table trellis, *c* the trellis on the back wall; along with which a hanging trellis, represented at p. 156, is sometimes employed, although this is not approved of by many. The flue, which is built on pillars, and returns on itself, occupies the centre of the house. Where hot water is employed, the pipes will, of course, occupy the place of the flues. The trees are trained to the two

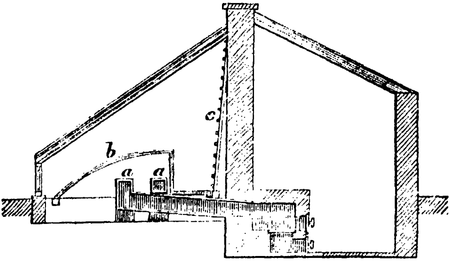


Fig. 33.

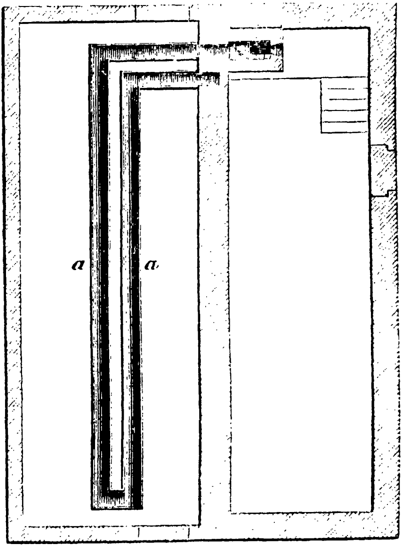
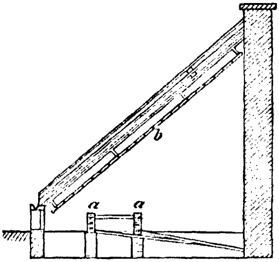


Fig. 34.

trellises *b* and *c*, and to the hanging trellis, if such be in use. Against the back wall three or four dwarf trees are planted, with intermediate *riders*, the latter being altogether removed at the end of four or five years at furthest. These, with three for the front trellis, make in all nine or ten trees for each house.

Fig. 35 represents another form of the peach-house, not so generally used as the former, but of equal if not superior merit. We have supposed it heated by water *a*, *a*, but that is not an essential matter, as a common flue is equally applicable. There is no upright front glass, nor any trellis on the back wall, the trees being planted in front, and trained on a wire trellis *b*, attached to the rafters, and covering the whole surface of the sloping roof. As the peach-tree is not found to extend much more than twelve or thirteen feet on the open wall, the length of the rafter, inside measure, need not extend beyond fourteen feet. It is obvious that in such a house the trees must enjoy an equable, and, from their proximity to the glass, an advantageous degree of light. Besides, being planted close to the front wall, they are not exposed to have their roots stunted in passing under the flues and through the interior soil of the house, which, in spite of every assiduity in water-



ing and manuring, is apt to become hard and impoverished. Further, it has been estimated, that, as far as roof and glass are concerned, four or even five such houses may be erected at the same expense as three of the common form.

In Holland, peaches are forced in pits resembling the common hotbed or melon-pit of this country. The trees are trained on a trellis-work near the glass, and the air is heated by the fermentation of stable-dung linings. The method has been partially adopted in this country, with, however, the use of hot water. When garden-architects shall cease to be anxious about making all forcing-houses ornamental structures, this will probably be the general form in which early and tender peaches will be cultivated.

The pruning and training of peach-trees in the peach-house does not differ materially from the practice out of doors. The sashes having been removed in the autumn, are replaced about New Year's Day. Fire-heat is commonly applied about the beginning or middle of February; but where there is a large suite of houses, and an extended succession is wanted, forcing, as it then truly becomes, may begin a month sooner. At first the temperature is kept about 45°, but it is afterwards gradually increased to 50° or 55° Fahrenheit. While the trees are in flower, and till the fruit be set, the house is occasionally steamed, either by sprinkling water on the warm flues, or by admitting the vapour from the pipes, where steam is employed for heating. After this period the foliage is washed, from time to time, with the garden-engine. When the fruit is stoned, or the kernels have been formed, the temperature is raised to about 60°. Water is now copiously supplied to the border: the fruit is thinned out; the various operations of disbudding and tying are performed, and air is admitted in abundance. After the end of April little fire-heat is required for the peach-house.

The trees often suffer from mildew. From this malady an application of soap-lather is one of the most effectual remedies: the best preventives consist in keeping the borders of the peach-house clear, and in good condition as to fresh soil, and in taking care that nothing be permitted to obstruct the free circulation of air and full admission of sun. If aphides infest the house, a fumigation with tobacco should be resorted to.

It may here be remarked, that, by curious cultivators, several uncommon kinds of exotic fruits are occasionally grown with success in conservatories, vineries, hot-houses, or other glazed structures, along with the more regular or usual inmates. Among these may be mentioned the Loquat (*Eriobotrya japonica*); the Jamrosade (*Eugenia jambos*); the Purple Granadilla (*Passiflora edulis*); the Granadilla vine (*P. quadrangularis*); the May-apple (*P. incarnata*); the Water-lemon (*P. laurifolia*); and the Sweet Calabash (*P. maliformis*); the Papaw (*Carica Papaya*); the Banana (*Musa sapientum*); and *M. Cavendishii*, which last yields its fruit readily, while the plant does not attain an inconvenient size. The Leechee, (*Nephelium Litchi*), has occasionally ripened in our stoves; the Longyen (*Euphoria longana*), has yielded its fruit at Syon House; and the Mango (*Mangifera indica*) at the garden of Earl Powis. The China Guava (*Psidium cattleianum*) fruits freely in the vinery of the Experimental Garden at Edinburgh:

the fruit is round, about the size of a small plum and of a fine claret colour ; the pulp soft, only a little firmer than that of a strawberry, and of a pleasant subacid flavour, making a most desirable preserve. The Carambola (*Averrhoa Carambola*), of the East Indies, has also been added to our exotic fruits, the fruit of which is of the size and shape of a duck's egg, but with longitudinal ribs on the sides ; either in tarts or as a preserve, the flavour is excellent. It may be noticed, that, both from the descriptions of intelligent travellers, and from the preserved fruit being sent to Britain, we know that various species of exotic fruit-trees exist, which have not yet reached us in a living state ; and the introduction of these might form an object of innocent, pleasing, and commendable ambition to enterprising and wealthy horticulturists.

3. The Cherry-House.

In its general arrangements the cherry-house resembles the peach-house, with the exception of the front trellis, the place of which is commonly occupied by a stage for pots of early strawberries or kidney-beans. The cherry-trees are trained against the back wall : the house should therefore be narrow, and the roof steep. The operation of forcing generally commences early in January, with a very moderate temperature. Air is admitted freely till the flowers begin to expand, when great caution becomes necessary. When the fruit is setting, the temperature is kept as steadily as possible at 50° ; after it is set, abundance of water is applied to the roots and foliage of the trees. When the fruit is colouring, water is almost entirely withheld, and air freely admitted. During the whole process of forcing cherries, any excessive heat from the sun's rays must be carefully guarded against, by shading or by admitting of air. The kind of cherry usually preferred for forcing is the common May-duke. A cherry-house ought to form a part of every large garden establishment; for nothing more signally distinguishes the tables of the opulent, in March and April, than ripe cherries appearing along with strawberries in the dessert at that season of the year.

4. The Fig-House.

This scarcely differs in form and management from the cherry-house, the trees being trained to a back trellis, with the addition, however, of dwarf standard trees in front. The second crop is often the most productive. It is seldom, however, that a separate house is erected for this fruit. The fig succeeds very well as a dwarf standard between the front flues of a vinery, provided the roof be not too closely covered with the foliage of the vines. Of late small standard figs have very commonly been grown in large pots, fourteen or fifteen inches in diameter, and placed in any of the forcing-houses. In this way considerable crops of fruit have been raised. The *Figue blanche* and the *Marseilles* are the sorts considered best adapted for forcing.

5. The Orangery.

The orangery, in this country, seldom differs in form, even where it is a separate structure, from that of the greenhouse. Most commonly the few orange plants which are kept are grown in large pots, or in tubs or boxes, and occupy a place with other exotics on the greenhouse shelves. When the trees are of considerable size, the boxes or square tubs are so constructed that they can be partially taken in pieces, without materially disturbing the roots of the plants; and the soil can then be renewed or meliorated on the different sides at successive periods. Of late such tubs have been constructed of large slates; these have an elegant appearance, and they are equally convenient, the sides being removeable as in the wooden structures. At some places the orange trees are planted in conservatories erected for the purpose. In the neighbourhood of Paris, the orangeries are little better than dark sheds, in which the trees are kept protected during the winter months, light and air being given only when the weather permits. At Woodhall, in Lanarkshire, they are trained against trellises, under glass, and in this way produce abundant crops of fine fruit. We have there seen a plant of the St Michael's orange, twenty-four feet wide, and eighteen feet high, clothed with fruit.

The orange tribe (*Citrus*) are cultivated in Britain rather as objects of curiosity and beauty, than for the purpose of affording a supply of fruit. Commerce with Portugal, Spain, Italy, and China, has brought this class of fruits within the reach of every one; and the copious importations which annually take place have no doubt discouraged the cultivation of the plants. A few orange-trees are nevertheless to be met with in most collections, and in large and sumptuous gardens it is not uncommon to meet with glazed houses specially set apart for their reception.

Middle-sized plants are frequently imported from the

Italian nursery-gardens, and this is the readiest way of procuring large specimens at a cheap rate. The plants are closely packed in boxes, with some grass or moss around the roots. Upon their arrival they are in a withered and dead-like state, and require considerable care and management to recover them from the effects of the voyage. When propagated in this country, they are budded on citron or Seville orange stocks ; the former recommended by Miller as preferable. The seeds of the stocks are sown in pots, and the growth of the seedlings is aided, during the first and second summer, by the application of slight bottom-heat in a hotbed frame. These are usually budded in August. The late Mr Henderson, gardener at Woodhall, used to graft his trees, employing scions formed of the wood of the second year. He also propagated by cuttings, considering this the quickest mode of obtaining plants. We may add that this most successful cultivator of the orange tribe made it a rule to keep his trees rather cool, and with plenty of air in mild weather, till the fruit was fairly set ; after which he found that he could apply more heat without the risk of the fruit failing.

The orange tree prospers in a rich, fresh, and rather strong soil ; and in this country it is the practice to mix with it a considerable portion of well-rotted manure. When grown in pots or boxes, the plant should be shifted, and the earth partly renewed, every spring. In summer, copious waterings are given, and the leaves are syringed once or twice a week. The heads are kept thin, and any branches which inconveniently cross each other are removed. When planted against trellises, they are trained in the fan form ; and in laying in the shoots, allowance is to be made for the size of the leaves in the different species.

The following are brief notices of some of the cultivated species of the genus *Citrus.*

C. Medica, the Citron (the Cedrate of the Italians), is a small evergreen tree. The fruit is large, of an oval form, and covered with a rough skin or rind, which is charged with a highly fragrant oil. The citron is generally used in confections. It is supposed to be a native of Media, and will scarcely ripen without protection in Britain. Three subvarieties of citron are described by Risso.

C. Limetta, the Sweet Lime. This is rather a tall tree, with diverging branches. The flower is of a fine white colour, composed of five oblong petals. The fruit is globose, with a black nipple-like protuberance at the apex; it has a firm rind and sweet pulp, and the colour is pale yellow. The lime is a native of Asia, but cultivated in Italy. Seven varieties have been described.

C. Limonum, the Lemon. The petioles of the leaves somewhat winged; fruit oblong, with a thin rind adhering closely to the very acid pulp. This, like the preceding, is a native of Asia, but is cultivated in the south of Europe. There are numerous varieties.

C. Aurantium, Sweet Orange. The petioles almost naked; fruit globose, with a thin rind and sweet pulp, Risso has enumerated nineteen varieties; of which the principal are, the China, the Portugal, and the Maltese. The last has a blood-coloured pulp, with rich juice, and is now much in request. The Tangerine orange may be cultivated successfully in a common flower-pot, producing fruit of delicious quality for the dessert.

C. Bigarda, Seville or Bitter Orange, the most hardy of the tribe. The petioles winged ; fruit globose, with a thin rind, and bitter juice. This sort is employed for making marmalade, and is also used in medicine. Twelve varieties have been described.

C. Decumana, the Shaddock. The petioles broad, with cordate wings ; fruit large, round, weighing from ten to fourteen pounds, with a thick rind. This fruit was carried by Captain Shaddock from China to the British West Indies, where it first acquired the name which it here bears. It is now cultivated not only in the West India Islands, but extensively in South America. Four sorts are enumerated. Of all the Citrus tribe, this has the most beautiful foliage, and it is therefore not improperly selected for filling the back wall of a vinery.

6. THE PINERY.

The Pine-Apple (*Bromelia Ananas* L., or *Ananassa sativa*) is comparatively of recent introduction into Britain. It was nearly unknown to our horticulturists in the beginning of the eighteenth century ; for Thoresby, the Leeds antiquary, kept a leaf of the pine-apple in his museum as a curiosity. It is now largely and successfully cultivated in all the principal gardens in this country. Its culture requires all the ingenuity, judgment, and watchfulness of the skilful and diligent horticulturist; and we shall, therefore, treat of it at considerable length. It derives its name from the general resemblance of its fruit to a large cone of a pine-tree.

The fruit is a kind of pulpy strobilus, formed of coadnate berries, and crowned at top with a tuft of small pointed leaves. The flavour of the pulp is of the most exquisite kind. The plant is herbaceous, and the fruit-stem, which generally appears in the second or third year, is surrounded with long serrated leaves, resembling those of some species of aloe. The fruit grown in Britain is considered equal in all good qualities, and generally superior in size, to that reared in tropical countries.

The pine-apple has generally been found to require cultivation for two or three years before it perfects its fruit; its culture has, in consequence, been divided into three periods,—propagation, successional preparation, and fruiting; and each of these periods has its corresponding structure, viz., the Nursing-pit, the Succession House or Pit, and the Fruiting-house.

The *Nursing-pit* has occasionally assumed a great variety of forms, respecting which, however, it is not necessary to go into minute detail. For summer use a large glazed frame, placed upon a hotbed of stable litter and tanners' bark, is perhaps the best hitherto devised. The Alderston Melon-pit, and Atkinson's Melon-pit, described under the head Melonry, are likewise very suitable for this purpose. In winter, it is desirable to have the assistance of fire-heat, either from flues, or, what is better, from hot water; though this fire-heat is not indispensable.

The *Succession-pit* performs the same functions as the Nursing-pit, but at a more advanced stage of the growth of the plant, and consequently requires an increase of size. With this difference, Atkinson's Melon-pit does very well for summer use. In colder seasons, we should prefer a pit similar to that represented in the annexed figs. 36 and 37, in which a hot-water apparatus on the syphon principle is employed to heat the atmosphere of the pits, and the bottom-heat is communicated by the circulation of hot water from the same boiler, in open troughs resting on the bottom of the pit. The boiler *a* is placed nearly on a level with the bottom of the pit; *b* pipes on the syphon principle for warming the air of the pit; CC troughs for communicating the bottom-heat, placed in the bottom of the pit on a level with the boiler. The water is drawn from the boiler to the ends of the troughs *dd* by small moveable syphons, which promote its circulation. The bed *e*, in which the plants are plunged, is supported by a framework of wood, resting on brick piers between the troughs. A boiler placed in the centre is sufficient for a range of sixty feet. Pits such as these have been in successful operation for some years in the gardens of the Earl of Hopetoun, and were designed by Mr Charles H. J. Smith, landscape-gardener and garden-architect, of whose as-

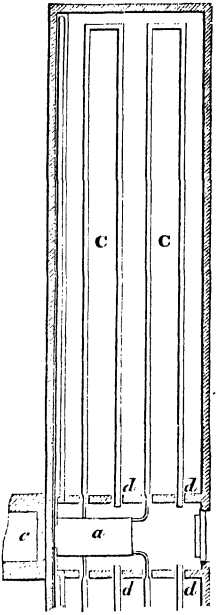


Fig. 36—Ground Plan.

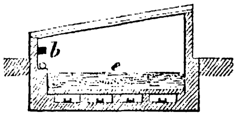


Fig. 37—Section.

sistance the writer of this treatise has had much satisfaction in availing himself, in the designing of the illustrative sketches and diagrams. Mr Smith also proposes another form of a succession-pit, fig. 38, entirely heated by hot water. The surface-heat is supplied by pipes in front; the bottom heat is kept up by small pipes from the boiler, passing through cisterns of water extending the whole length of the pit. In this case it would be necessary to apply the heat only during the day.

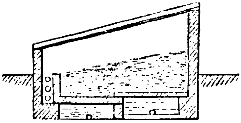


Fig. 38.

In the *Fruiting-house*, more room, greater height, and a more powerful temperature, are requisite, and to attain these objects many varieties of structure have been devised; but we shall notice those only which are most worthy of attention. The first we shall mention is Baldwin's fruiting-pit, of which a section is given in fig. 39. The roof is unequally ridged, the north or shorter side being slated and furnished with ventilators, to admit air. The sashes are immoveable,

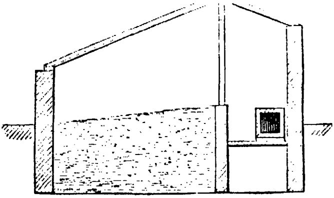


Fig. 39.

and the laps of the panes are closely puttied. There is a path within, and a single turn of a flue behind. We should prefer the following form, fig. 40, in which

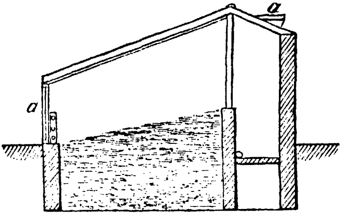


Fig. 40.

there are ventilators *a a*, and a hot-water apparatus surrounding the whole pit. The dimensions of this may be fifty feet long, and nine feet wide; the glass being two feet and a half from the curb of the bark-pit in front, and five feet behind. We next present a section of a pine-pit with a curvilinear roof, fig. 41, in

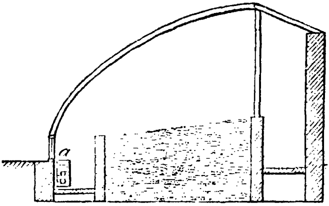


Fig. 41.

which the astragals are parallel. A segment of an elliptical arch somewhat less than a quadrant, the origin of the curve being on the front wall, seems better adapted for a pit than any portion of a circle. This pit is supposed to be heated by a small steam-pipe passing through a large iron tank or cistern *a*, filled with water, on the same principle as exhibited in fig. 16.

The old-fashioned pine-stove was a lofty structure, in the vinery form, with front sashes. It used to be forty or fifty feet long, and twelve or fourteen feet broad, and was commanded by two flues. In addition to the pine-plants in the pit, the roof was also partly covered with vines, a practice justly condemned by Nicol in his "Forcing Gardener." We are also disposed to agree with that experienced writer regarding the disuse of the pine-stove itself. Besides other grievous faults, a single house affords too little room; and it is a matter of experience, that where the stock of pine-plants is not extensive, certain and abundant crops of fruit cannot be expected. Instead, therefore, of a succession and fruiting house of the old form, with two fires each, it would be better to have four pits with single fires, or, better still, to employ hot water. There might be two succession-pits of the forms represented *supra*, figs. 37, 38, and two fruiting-pits similar to figs. 39, 40, or 41. These would contain a much greater number of plants than two pine-stoves, and would be little more expensive in erection.

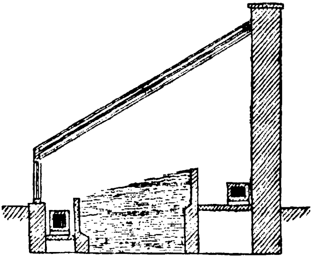


Fig. 42.

Bottom-Heat.—As a substitute for the warmth absorbed by the earth from the powerful rays of the sun in tropical countries, the pots of pine-plants are generally plunged in a bed composed of tanners' bark, decaying leaves, or other fermenting substances. Tanners' bark is most commonly used. Leaves shed by hardwood trees in autumn are preferred by some, while others form the under and greater part of the bed with stable-litter. Whatever substance is employed, it should not be put into the bed until the first violent heat of fermentation has passed; or, if circumstances impose a necessity of using it in a recent state, it should be largely mixed with old materials of the same kind. A layer of exhausted bark, ten or twelve inches thick, should be laid on the surface of the bed. In pine-stoves, the curb of the bark-pit is usually elevated about three feet above the common level of the house, and has a gentle slope towards the front; in pine-pits, however, it approaches, more closely to the glass. The bark is commonly five or six feet deep; but it may be questioned whether this depth is not excessive and unnecessary. A bed about three and a half feet deep would probably be more convenient, and afford a heat sufficient, both in intensity and duration, for any useful purpose.

We have already shewn how a system of tubes transmitting steam or hot water may be made available for the production of bottom-heat. There is another method worthy of at least a cursory notice. Its invention is due to Mr M'Murtrie, and it will be understood by the section and plan given in figs. 43 and 44.

A shallow bark-bed, about two feet deep, rests upon an arched chamber of single brick. 1 is the fire-place;

2 a fire-flue running along the whole length of the chamber 4, which is also kept full of steam by means of the boiler and pipe 3; the aperture 5 admits steam

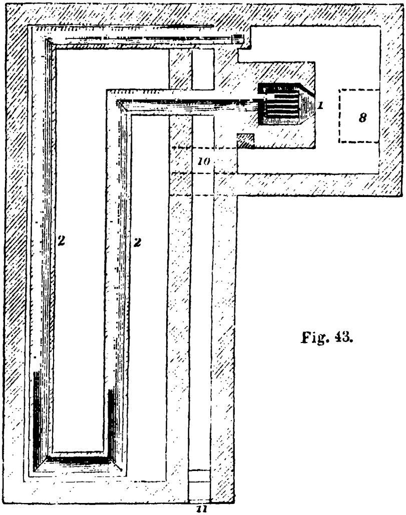


Fig. 43.

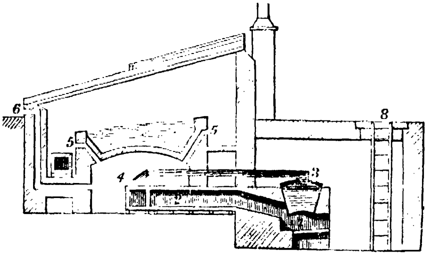


Fig. 44.

and heat into the air of the pit, and of these there is one, both in back and front, under each sash, capable of being stopped at pleasure. The waste-pipe 6 allows the steam to escape, when the apertures marked 5 are shut. By the return of the flue 2, the atmosphere of the house is heated; and by the joint action of the inclosed part of the flue, and of the steam in the chamber, an abundant and salubrious bottom-heat is easily maintained.

The proper management of bottom-heat is a matter of some difficulty, and in this there have been more failures than in any other part of the pine-apple culture. The heat arising from violent fermentation is greater than the tender roots can bear, and if all watchfulness be not employed, the labour of many months may be rendered useless in a single day. Knight discarded bottom-heat altogether; but he did not succeed in convincing others that pine-apples could be grown equally well without it. Bottom-heat is, however, very generally kept too high. Perhaps the upper limit of its temperature may be fixed at blood-heat, or at most 100°, while the under or winter limit may be brought down to 70° or 75°. Gardeners are accustomed to judge of the heat of the bed by means of long sticks pushed into it; these are occasionally drawn out and felt by the hand, and a rough guess at the temperature is thus obtained. A far preferable method is to employ a slow thermometer, slightly cased in wire, to protect it when pushed into the bed.

Soil.—Various nice and minute directions have been given respecting composts for pine-apple plants. Any compost, however, will be found suitable, which is at once rich, fresh, and simple. Perhaps a mixture of the top-spit, including the turf of an old pasture, and about an equal quantity of good, well-rotted dung, combines these qualities as completely as possible. When it is necessary to lighten these materials, a compost of decayed leaves and a little sand may be added. It is of importance that the compost, whatever it may be, should be prepared a considerable time beforehand, and frequently turned over. It should be broken with the spade, but not screened ; and when used, it should not be too moist. Pine-apple plants are found to shew fruit more readily in a rich light soil, than in strong loam, but not to produce such large fruit. In selecting his compost, the cultivator must make his election between these advantages. At all events, the soil must be rich ; it can scarcely be too rich. "The pine," says an intelligent writer in the Gardener's Magazine, vol. ix., "is a gross feeder, and will thrive in vegetable manure, however rich and fresh." Liquid manures have been applied ; but these, however useful when recent, prove deleterious in a fermented state.

Propagation.—In the cultivated state, the fruit of the pine-apple becomes so succulent that it seldom or never forms seed. The different varieties are propagated by planting the crowns or tufts which grow on the fruit, or the suckers which appear at the base of the stem. These, when removed from the fruit or the stem, are laid aside for a few days, till the scars at the place of separation have dried or healed, a precaution to prevent their rotting ; after which they are potted immediately. Sometimes late in the season, they are merely thrust into exhausted tan, without pots, where they remain till the following spring. In general the offsets should be as large as possible. Speechly did not break off his suckers before they were twelve or fourteen inches long, and he reserved only the largest crowns. These large suckers and crowns grow with greater rapidity, and come sooner into fruit, than those of smaller size; and in this consists the principal secret of what has been called the short method of culture, by which fruit is obtained in a much briefer space of time than usual. The soil employed in propagation is rather lighter than that afterwards applied. The pots may be from three to six inches in diameter, and, to promote draining, should contain at bottom a layer of small broken stones or clean gravel. For some time the plants are shaded from the rays of the sun, and in about eight or ten days they receive a little water. It may be laid down as an important general rule, in the culture of the pine-apple, that the progress of the plant should be carried on without intermission,—without a check,—without allowing it to flag for an hour. As already stated, the older and more common routine of pine-apple culture embraced a period of three years: but recent improvements have reduced these to two years, or even to eighteen months. This has given rise to two modes of preparatory management, which we shall notice separately, premising that the treatment in the fruiting-house is the same in both.

Triennial Course.—The plants which were potted in autumn are kept in the nursing-pit during winter, with a mild temperature, slight bottom-heat, and sparing allowance of water. About the beginning of April they are transferred into larger pots, and are commonly shifted into hotbeds, or pits heated with stable-dung, in which they are found to prosper exceedingly. Air is given every day, and is copiously admitted as soon as the sun's rays have acquired considerable power. During summer the average morning temperature may be from 70° to 75° Fahrenheit, but in sunshine it may be allowed to rise to 85°, 90°, or even more. The heat is maintained by adding occasional linings of stable-litter, and when it is exhausted, the plants are transferred into other beds or pits, more recently made up, and in which fermentation is going on. In flued nursing-pits the management is precisely the same. The bottom-heat is aided by fresh additions of tan. As nothing is to be dreaded from damp where there is a command of fire-heat, more copious waterings may be given, and the plants may be syringed overhead, or slightly steamed, by throwing water on the flues. It is not very common to shift the plants in the nursery during summer; but it is a good rule to have recourse to that operation as often as the roots begin to mat on the sides of the pot. Before the end of autumn the young plants become vigorous. The lower part of the stalk should then be thick, the centre or funnel formed by the leaves should be upright, open, and rather short, and the leaves themselves not long nor very numerous, but broad, stiff, succulent, and free from contortion and deformity. Towards the end of autumn, the plants are taken into the succession-pit, which, in fact, is only a nursing-pit on a large scale. The temperature for winter should be about 60°. About the middle of March, they are shifted into pots nine or ten inches in diameter. At this period, it is not uncommon, in compliance with the recommendation of Abercrombie and the other older authorities, to cut away the whole of the roots, and to repot the plant somewhat in the capacity of a sucker. The reasons alleged for this extraordinary practice are, that the pine-apple plant is continually pushing out roots at the surface, while those below are rapidly dying; that the soil, in the course of three years, becomes completely exhausted ; and, lastly, that this treatment prevents premature starting in the course of the second year. This last reason is very questionable, and it assumes that pine-apple plants *must* be treated for three years before they produce fruit. There is some force in the other reasons, but they certainly do not prove the necessity of the practice. Roots may be pruned without being removed altogether. The earth may be shaken almost entirely away, and replaced by fresh compost, at the expense of only a few fibres. Again, if, at every shifting, a small portion of the earth be taken from below, as florists treat auriculas in pots, at the end of two years scarcely any portion of the original soil will remain. The grand objection to the operation is, the great and unnecessary check to vegetation, and the consequent stuntedness of habit, which, in succulent plants of such an age, is scarcely remediable. That it is possible successfully to cultivate pine-apples without thus cutting away the roots, is borne out by the testimony and practice of Griffin, Appleby, and other distinguished cultivators. When the roots are even partially removed, the plants must be shaded for some time, and be watered sparingly, till they begin to grow freely. The summer temperature should be comparatively warm, the range being from 65° to 70° of fire-heat, or during night, and from 70° to 85° solar heat. Abundance of air should be admitted, and the plants ought to be set widely, that they may have room to swell below, and become stout and bushy.

Biennial Course.—The method of culture which we have denominated the biennial course, was first brought into notice by Abercrombie, and was subsequently strenuously recommended by Baldwin. Its chief feature is the acceleration of the growth of the plants by the application of higher temperatures than it was formerly supposed they would flourish in. They are, in fact, made to attain the growth of two summers in the course of one year.

About the beginning of March, the most forward of the plants potted over winter, or the suckers kept in tan, are taken out, the earth or tan taken away, and the roots shortened. They are then put into pots about five inches in diameter, which are plunged into frames or pits heated with tan or stable-litter. They are shaded as usual, and, after they begin to grow, receive moderate waterings. When the roots appear around the balls of soil, which will be about the middle of June, the plants are again shifted into larger pots from six to seven inches in diameter, and, if the heat be declining, are removed into other pits or beds. In the beginning of August they are transferred into large pots, in which, unless they are intended for early spring forcing, they stand during the winter; and in February they are finally shifted into pots twelve or fourteen inches in diameter. For spring forcing, the last shifting takes place in October, and the pots may be two inches narrower. At every shifting the ball of earth is preserved entire. From March the temperature is gradually increased; little air is admitted, even in strong sunshine, and a lively bottom-heat is kept up by means of repeated linings. When there is danger of scorching the roots, the pots are partially drawn up, or even set upon the surface of the tan. The following table will give an idea of the temperature (Fahrenheit's thermometer) and its progressive increase, although a somewhat mitigated scale is adopted by many skilful horticulturists.

	During Night.	During Day.
March	60° to 70°	60° to 80°
April	70 — 75	70 — 85
May	75 — 80	90 — 100
June	80 — 85	100 — 120

After the beginning of July, the heat is allowed to decline by degrees, until it arrives at the winter temperature of 60°. It is to be understood, however, that these temperatures regard only stable-dung or tan heat; and that, too, applied to crowns, as the larger suckers seldom require more than 100°. When fire-heat is used, and it should always be through the medium of hot water, the nocturnal temperature should only approach towards 80°; and there should be some expedient for the *slow* immission of steam into the atmosphere of the pit. During the whole summer, care is employed to prevent the plants from being *drawn*, and for this purpose they are allowed much space, and are placed as near the glass as possible. In August and September abundance of air, and more copious supplies of water, are given. In winter, the chief care is to preserve the roots from damping off, and for this reason, though it is not the common practice, we should prefer water in pits having at least the command of fire-heat.

This mode of *driving*, as it has been significantly called, is applicable chiefly to the varieties called the Queen, and Ripley's New Queen; most of the large growing sorts requiring a longer period. It is desirable, therefore, that both courses of culture should be carried on at the same time; so that the larger varieties may be consigned to the triennial course, while the vacancies in either may be made up from the other. That this is practicable, at least in gardens where there are two fruiting-houses, may be seen from the tabular compendium of culture given at pp. 191, 192.

Fruiting-House.—About the beginning of August, the plants, now two years old, are shifted for the last time. The pots are from twelve to fourteen inches in diameter, and the balls are preserved entire. About eight or ten days previously, the bark-pit of the fruiting-house should be cleared out, the old tan screened if necessary, and fresh material supplied. The pots are then plunged into the bark as deeply as can be done with safety, and the plants are so treated as to keep them in a growing state during the whole of autumn, In winter, the nocturnal temperature is kept at 60°; but towards the end of January it is gradually raised to 70°. This rise, however, should follow, and not precede or be a cause of the vernal growth of the plants. About the middle of February, the second fruiting-house may be prepared for the reception of the plants in the biennial succession-pit. These are existing in a mild temperature, and start during the general progress of the season.

That period at which pine-apple plants first shew their fruit-stalks, or, as it is technically termed, *start*, is the most critical in their whole culture. It is generally desirable that this should happen at a certain age, and at a particular season; but these are circumstances over which the cultivator can scarcely be said to have a direct control, and accordingly, while the most successful can hardly deem themselves beyond the reach of failure, the less skilful are very liable to err. We are not aware that the *rationale* of starting has been investigated on the principles of vegetable physiology; and it is certain that the most absurd practices have been resorted to, in order to force the plants into fruit. We pretend not to give a theory; but a few practical remarks may be of advantage. It is evident, then, that the plant must be of a certain age, or at least of a certain magnitude, before it will start freely or to good purpose. Suckers of the first year exert all their energies in the production of roots and foliage; and if any of them happen to start, they exhibit little more than a tuft of leaves where the fruit should be. In the second year a Queen pine is capable of producing a perfect fruit; and in the third year the New Providence and other large varieties arrive at puberty. The solid part of the stem is then observed to have increased in bulk, and to have ascended considerably above the soil. It is of more practical importance, however, to remark, that the fruit-stalks do not appear until the pot is well filled with roots. Apparent exceptions there may be to this rule; but in every case where it does not hold good, the plant will be found to be diseased, or the roots to have been violently destroyed. The grower should therefore take care that the roots shall have nearly occupied all the new soil before the end of autumn, and that in the course of the winter the tender fibres be not exsiccated by drought, or rotted by excessive moisture. Again, it is probable that at starting there is a peculiar check in the growth of the plant, which causes it to divert the sap from the formation of leaves, and, like most other vegetables in straitened circumstances, to provide the means of reproduction, by throwing out flower-buds. This diversion of the sap is influenced by the quantity of vigorous fibres, for it is observed that when, from some accident, plants not well furnished in this respect do shew fruit, they bestow the greater part of the sap upon the leaves. Further, it is not a mere suspension of vegetation, otherwise fruit would be produced by every plant which has had the roots cut from it in the manner noticed above. Lastly, it is probable that the proper check consists in a transition from growth, however slight, to a temporary suspension of vegetation, which again is followed by a copious flow of the sap, circumstances which, as might be easily shewn, occur both in the winter and summer starting. If these imperfect observations be correct, it follows, that starting is a natural process, requiring certain conditions in the state of the plant, and therefore not to be forced by violent treatment, or any sudden changes in temperature and watering.

After the plants have shewn fruit, they are never shifted; but the surface-soil may be removed, and replaced by a little fresh and rich compost. Water is supplied from time to time as necessity requires; but it is impossible to give any definite rule on this subject. The observant gardener will soon, from experience, discover the proper measure. Water should never be given in a colder state than the average temperature of the house; when, therefore, there is no tank within the house, the watering-pots should be filled, and left in the house for some time before the water be applied. Fire-heat is kept up either continuously or at intervals, during the greater part of the season. It should always be moderate, never exceeding, by itself, 70°. During sunshine, the temperature may range from 70° to 100°. The greater proportion there is of sun-heat the better. Whilst the fruit is swelling, care must be taken to carry on the growth of the plant with equability and moderation. Violent checks are pernicious: they debilitate the stalk, and cause a stringiness in the fruit. As the fruit approaches maturity, water is gradually withheld, lest the flavour should be injured. Pine-apples should be cut a short time before they attain complete maturity. The larger varieties will keep good only for a day or two: the smaller varieties a week or more.

The following tabular compendium is from Abercrombie, altered, however, in some of its details, to suit the idea of two crops a-year. To execute this plan, two fruiting-houses or pits, and one succession-pit, would be required, together with a variety of hotbeds, or pits for the nursing department. It is necessary to premise, that crowns and suckers are usually potted soon after they are taken off, and that August 15 may be considered the date at which the whole operations of potting should be finished. When there is only a biennial course, it commences from about February 14.

COMPENDIUM OF THE CULTURE OF THE PINE-APPLE.

TRIENNIAL COURSE.

Nursing-Pit.

1854.

Aug. 15. Crowns and Suckers of the New Providence and other large varieties planted; also small crowns and suckers of the Queen pine.

1855.

Feb. 14. Small offsets of the Queen pine dibbled into the tan.

April 1. The above potted or re-potted: the balls of earth preserved entire.

July. Aug. } The intermediate shifting: time determined by expediency.

Succession-Pit.

1856.

Mar. 1. The plants from the nursing-house are shifted into larger pots: the greater part of the earth is renewed, and the roots pruned.

June 1. Second intermediate shifting.

BIENNIAL COURSE.

Nursing-Pit.

1854.

Aug. 15. Large crowns and suckers of the Queen pine planted.

1855.

Feb. 14. Large offsets of the Queen pine dibbled into the tan.

Mar. 15. The above potted or re-potted; the earth or tan is shaken away, and the roots pruned, the plots transferred into hotbeds or pits.

June 15. First intermediate shifting.

Aug. 1. Second intermediate shifting.

Succession-Pit.

1855.

Oct. 1. Plants introduced from the nursing-pit; but not shifted unless intended for early spring forcing.

COMPENDIUM OF THE CULTURE—*Continued.*

TRIENNIAL COURSE.		BIENNIAL COURSE.	
	Fruiting-House.		*Fruiting-House.*
1856.		1856.	
Aug. 15.	Between this period and September 15, the plants, after having been shifted into full-sized pots, are introduced from the succession-pit.	Feb. 15.	Plants shifted for the last time, and introduced from the succession-pit.
1857.			
March.	The surface of the pots are top-dressed.		
June. Aug.	Fruit ripens, and the course concludes.	Sept. Dec.	Fruit ripens, and the course concludes.

The *Lond. Hortic. Catalogue* enumerates 56 varieties of the pine-apple; of these the following may be deemed most worthy of notice.

The *Queen Pine* is very generally cultivated. The fruit is of a cylindrical or tankard shape, of a yellowish colour inclining to orange, and sometimes weighs three pounds; it is, at the same time, of fine flavour. This kind produces with greater certainty than most others, and the fruit may be easily ripened in fifteen or eighteen months from the planting of the crown or offset. It is therefore the most useful of all the pines. A sub-variety called *Ripley's Queen* is also excellent.

The *Black Antigua* has leaves armed with large spines: the flowers are purple; the fruit cylindrical, averaging five pounds weight. It should be cut a little before it is ripe.

The *Black Jamaica* or *Old Jamaica.* In this variety the spines on the leaves are small: the flowers purple; the fruit oblong, averaging about four pounds. This is an excellent kind, and is considered the best sort for fruiting during the winter months.

The *New Jamaica* is rather an inferior kind, but is pretty good when ripened in the summer time.

The *Brown-leaved Sugar-loaf* is a capital black variety; and the *Enville* a showy and useful pine, with large flat pips, and the fruit often attaining a considerable size.

The *St Vincent's*, or, as it is sometimes called, the *Green Olive*, has middle-sized spines, purple flowers, and pyramidal fruit, which average about two pounds and a half. It succeeds well as a winter fruit.

The *White Providence* has small spines, dark purple flowers, and oblong fruit of a large size, averaging, when well grown, seven pounds weight, and sometimes exceeding twelve pounds. The colour of the fruit is at first brownish-gray, but at ripening it becomes of a pale yellow. The pulp is yellow, melting, and abounds with quick lively juice, but not equal in flavour to some of the other kinds.

The *Trinidad* is remarkable for the great size of its fruit, which is said to attain sometimes the weight of twenty-six pounds. Its average is stated in the *Hort. Cat.* to be twelve pounds; but we have never seen it above half that weight. The spines are middle-sized, the flowers lilac, and the fruit pyramidal. Apart from its magnitude, it is, like the preceding, only a secondary fruit.

The following may also be named as good sorts:

Bagot's Seedling, Russian Globe, Green King (with smooth leaves), Striped Queen, Sierra Leone, Brown Sugar-loaf, and Orange Sugar-loaf. Three or four more, though of inferior quality, may be noticed for their beauty or curiosity, viz., the Blood-red, Otaheite, Scarlet, Welbeck Seedling, and the Havannah, the fruit of which last keeps long, and has sometimes been successfully imported into this country from Cuba.

7. THE MELONRY.

This department derives its name from the melon, the principal plant cultivated in it, and is an important appendage of the forcing garden. After noticing some of the most necessary apparatus employed in it, we shall treat of, 1. the Melon; 2. the Cucumber; 3. the Gourd; and 4. the Mushroom, and their culture respectively.

The common hotbed frame is most usually employed; and it is so well known as scarcely to require description. It is a rectangular box, with sliding sashes, which may be single, in pairs, or in threes. The length of the sash is generally five or six feet, and its breadth about three feet and a half. The back of the frame is about double the height of the front, it being intended that the slope should be set towards the south. When used, it is placed on a bed of fermenting vegetable matter, from three to six feet in thickness, according to the purpose to which it is to be applied, or the severity of the season. Stable-litter is the fermenting material most commonly employed; but tree-leaves, exhausted tanners' bark, or flax-dressers' refuse, are also used. Tree-leaves, when moderately dry and well trodden, are more equable in their fermenting heat, and retain it longer than the other materials mentioned. If a layer, half a foot thick, of bark be placed over a bed of leaves five feet thick, a gentle and uniform temperature may be commanded for several successive months.

The Alderston Melon Pit, of which the following is a section, is partly above and partly below ground. The front and back walls *a*, *a*, are of brick, supported on piers or stone pillars: *b*, *b*, are spaces inclosed within outer walls, and covered with boards to contain linings, which communicate, without any object intervening, with the fermenting substances in the interior of the pit. These spaces may be two feet wide; the interior pit should seldom be more than six feet in breadth. A principal quality of this structure is its neatness and cleanliness. (*Caled. Hortic. Mem.*, vol. ii., p. 217.)

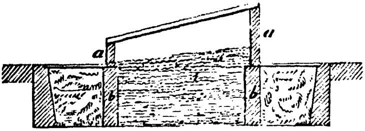


Fig. 45.

West's Melon and Cucumber Pit is also built of brick. It has in this figure a chamber *a* to contain the dung; *b* a square opening by which the dung is introduced; *c* rafters of wood or cast-iron, sustaining the interior

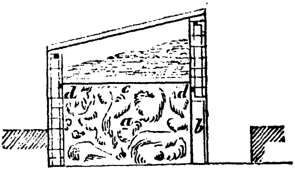


Fig. 46.

soil; *d*, *d*, openings to permit the ascent of steam. The walls are nine inches thick, and the pit may be seven feet wide inside measure. (*Lond. Hort. Trans.*, vol. iv., p. 220.)

Atkinson's Melon Pit, as given below, is a brick

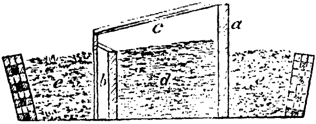


Fig. 47.

structure. The back wall *a* and the end wall are four inches thick, built in the pigeon-hole fashion, that is, with square interstices between the bricks. The front wall *b* is double: the interior portion is brick in bed, the exterior brick on edge, with piers under each rafter. The included space communicates with the inside of the bed *c*. The pit *d* is filled with fermenting litter or tanners' bark; *e*, *e*, are spaces for linings. This pit, according to the experience of the Horticultural Society of London, has been found "far superior to any other yet constructed." (*Trans.*, vol. vi., p. 373.) Sometimes the whole is formed of wood, or sometimes only the part above ground.

The extent of the Melonry must depend upon the size of the garden, and the amount of the demand. Where there is a large family, and especially where pine-apples are cultivated (to the forwarding of which some portion of the melonry may frequently be auxiliary), sixty or seventy sashes may be considered as a moderate complement.

1. The Melon (*Cucumis Melo*) has long been culti-

vated in Britain, but the period of its introduction and its native country are not well ascertained. The plant is a tender annual, requiring considerable care and skill to rear it in perfection; but it repays the labours of the horticulturist by affording a large, and to most persons a highly-palatable fruit. The varieties are numerous, and from their tendency to sport or vary, are rather fugitive in their duration. Many of the old favourites have disappeared, and those at present in vogue will doubtless take the same course, or will at least assume new forms, while they retain their old names. In these circumstances, it is deemed unnecessary to enter into minute description, or to do more than give a list of the sorts at present best deserving of cultivation.

Early Cantaloup.
Scarlet-fleshed Cantaloup.
Beechwood.
Smooth Scarlet-fleshed.
Duke of Bedford, green-fleshed.
Green-fleshed Egyptian.
Green-fleshed Italian.
Green Hoosainee Persian.
Golden Rock.
Silver Rock.
Cephalonian.
Kassaba, green-fleshed.
Sweet Melon of Ispahan.
Winter Grecian.

It may be noticed that all these belong to the species usually called the Musk Melon. The Water Melon (*Cucurbita Citrullus*) appertains to another genus, and is seldom reared in this country except as a curiosity.

It is important that no seeds but such as have been procured from approved genuine specimens of the several sorts should be sown. In general, the fresher or more recent that garden seeds are, the better; but the case is different with the melon. Here it is desirable that the seeds should have been kept in a dry state for a year or two: for it is found that plants produced from recent seeds push too vigorously, sending their shoots to a great length before they shew a single fruit; while those from old seeds are less luxuriant in growth, but more fruitful.

The melon succeeds best in a strong, rich soil. A compost, formed of two-thirds of rotted turf, and one-third of old cow-dung, will be found very suitable. This should be prepared for a year at least before it is employed in the melon frame.

There are generally several, perhaps three, successive crops of melons raised in large gardens. It is seldom expedient to sow before the middle or end of January, and sometimes it is soon enough a month later. A seed-bed capable of receiving a frame with a single sash is previously prepared. This bed, composed of fermenting stable-litter, should be of considerable thickness, perhaps about five feet. Immediately upon its formation, the frame and sash are placed on it, and they are kept close till the heat begins to rise, when the hot vapour is permitted to escape. Three or four days after the bed has been formed, it is covered over to the depth of three inches with earth prepared beforehand. Rich, light, dry earth, is best adapted for this purpose; and that it may be dry enough, it is proper to use such as may have been protected from rain during winter. A few small flower-pots are filled with the same earth, and kept in the hotbed, that the soil in them may acquire a proper temperature. The seeds are then sown in the flower-pots, and covered half an inch deep; after which the pots are plunged a little way into the earth of the bed.

When hot vapour rises copiously, fresh air is admitted by raising the sash a little. The frame is covered every evening at sunset with mats, and again is exposed in the morning about nine o'clock, sooner or later, according to the state of the weather. A single mat is sufficient at first, as the heat in the bed is generally strong. In two or three days after the seed has been sown, the plants appear, when the glasses are raised a little, to admit fresh air, and permit the escape of vapour. Unless this be done, the plants are apt either to damp off or become yellow and sickly. To guard against the casualties of the season, and the chances of miscarriage, it is proper to make two other sowings at short intervals, so that, if any accident befall the first plants, the others may supply their place. Two or three days after the plants have come up, they are transplanted into other small pots, only two or three being put into each pot. If the earth be very dry, it is now moistened with a little slightly tepid water. The pots are then plunged into the earth, and much care and watchfulness are employed to prevent the roots from being scorched. When the transplanted seedlings begin to grow, they are watered occasionally in the warmest part of the day. As the heat of the hotbed declines, it is supported by linings of fermenting litter, applied from time to time, around its outer sides. The lining should not exceed fifteen or eighteen inches in thickness, and should rise above the level of the bed upon the sides of the frame.

About a month after the seeds have been sown, hotbeds or pits are prepared for the reception of the young plants. For the first crop, it is generally found that hotbeds are preferable. These are formed about three feet and a half thick, and of such extent as to receive several frames of two or three lights each. The same precautions with respect to vapour, and other matters connected with the fermentation, are observed as in the seed-bed. When the violence of the heat has begun to subside, the surface of the bed is covered, to the depth of two inches, with dry, light earth; and under the centre of each sash, a conical heap of the same soil is formed to the height of ten inches. By the following day, the earth generally acquires a sufficient warmth, and the bed is ready for the reception of the plants. The pots containing the young plants should be well watered the day previous to their being *ridged out*, to make the ball adhere together, and come out of the pot entire. After the tops of the hillocks of earth have been flattened a little, in the centre of each a hole is made capable of containing one of the balls of earth which is to be turned out of the pots. Some of the pots containing the strongest plants are selected, and the young melon-plants are plunged out, with balls entire, into the ridges or hillocks already mentioned. After this operation has been performed, they receive a gentle watering. The sashes are replaced, and for some time, unless the vapour be strong, little air is given. Care is taken to prevent the tender fibres from being scorched. When the roots begin to shew themselves through the surface of the hillocks, a quantity of fresh earth is applied all around them, and in a week or a fortnight after the whole surface of the bed is covered nearly as high as the top of the hills.

When the plants have got two or three of their rough or perfect leaves, the top of the stalklet, which now begins to elongate, is pinched off, and from the axillæ of the leaves lateral shoots soon spring forth. These are fastened down with pegs, and are so disposed as regularly to cover the surface of the bed. These laterals will sometimes shew flowers at the second or third joints; if they do not, they are topped in their turn, and afford other laterals, which seldom fail to be fruitful. As these runners advance, they are trained along the surface, and all weak, useless shoots are removed. This should be done repeatedly at successive intervals, as it is found injurious to cut out a great quantity of shoots and foliage at one time. No plant, as has been shewn by Knight (*Hort. Trans.*, vol. i.), is more beholden to its leaves, both as respects health and flavour of fruit, than the melon. In cultivating the sweet melon of Ispahan, that excellent cultivator never suffered lateral shoots or blossoms to be produced at a less distance from the root than the fourteenth or fifteenth joint, or more, above the seed-leaves. In this way the expenditure of sap, being confined to the extremity of a single stem, was small compared with the quantity formed; it therefore accumulated, and afforded greatly increased nourishment to the fruit.

It is seldom proper to leave more than one melon on each shoot, and in the large kinds perhaps not more than four or five fruit should be left on one plant. When the melons begin to swell, a slate or piece of tile is laid under each, to separate it from the damp soil of the bed. During the process of growth, the fruit is usually turned once a-week, to expose all sides in succession to the rays of the sun; but, in turning, care must be taken not to twist the foot-stalk, as this would probably destroy the fruit altogether. At this period water is given with moderation, and abundance of air is admitted. The fruit should in general be gathered before it is fully ripe. Its approaching maturity is known by the appearance of a number of cracks near the footstalk, and by its exhaling a rich odour. When ripe, it should be taken off in the morning, and kept in a cool place till served up; if this precaution is not attended to, there will be a considerable deficiency of flavour. The kind called Winter Grecian Melon is described by Mr Lawson (*Agriculturist's Manual*, p. 407) as possessing the desirable property of keeping good for several months, if suspended in a fine net, in a cool, airy room.

The average heat required for the successful growth of melons is about 70° Fahrenheit. In the common hotbed, this is maintained by defending the bed during the night, and by applying linings from time to time. In pits heated by hot water, this is easily effected at any season; and were it not that the included air is apt to become too dry, especially in winter, when much heat is required, such pits ought doubtless to supersede the hotbed frame altogether. At present the old methods, partly, it may be, from custom, are still principally employed. It is unnecessary to give minute directions respecting the management of melons in pits; as in these the mode of procedure recommended for hotbeds, will, with some trifling variations, also prove successful.

2. The CUCUMBER (*Cucumis sativus*), like the melon, is a tender annual, requiring the assistance of artificial

heat. It properly belongs to the class of culinary vegetables, being used in salads and pickles. It has long been cultivated in this country; its culture, however, requires the closest attention of the gardener. The sorts commonly grown are—

The Early Frame.
Syon House.
Long Green Prickly.
Short Green Prickly.
Green Turkey.
Prize-fighter.

Of these, the long and short prickly are well suited for ridges in the open air.

The culture of early cucumbers so much resembles that of the melon, that it would be useless repetition to enter into minute details. The cucumber, indeed, is somewhat the hardier, and therefore in summer requires less heat; but in every other respect the management of the plants is precisely the same. The first crop of cucumbers is generally sown in the end of December, or the beginning of January; a second in March, and a third in June. In summer, cucumber plants, after they have been fairly established, require scarcely any other attention than to thin them out occasionally, and to supply them with water.

Cucumbers, particularly the prickly sorts, are often raised in the warmer months under hand-glasses. A cavity is made in a border in front of a wall or other warm place, and is filled with hot dung. This dung is covered with earth, and two or three plants are put into it, and sheltered with a hand-glass. They are watered and dressed from time to time; and by this means a sufficient supply of small cucumbers, or *gherkins*, is obtained for pickling.

In the southern counties of England, pickling cucumbers are easily raised without any artificial heat, being sown in drills in the open ground. The earth is made fine and level, and shallow circular hollows are formed with the hand, a foot wide, and half an inch deep in the middle. The distance between each hollow is three feet and a half, and the distance between the rows five or six feet. Eight or ten seeds are deposited in each cavity. This is done in the beginning of June. When the plants appear, they are thinned out to three or four, the weakest or least healthy being rejected. They are watered occasionally, according to the state of the weather. The cucumbers are not expected nor wished to attain a large size; they are gathered chiefly from the middle to the end of August. Vast quantities of these open-ground gherkins are taken to the London market. The village of Sandy, in Bedfordshire, has been known to furnish 10,000 bushels of drilled cucumbers in one week. Cucumbers may be procured in a hothouse during the winter months. For this purpose the seedlings are not raised till the month of August, and they are prevented from expending their energies in the production of blossom or fruit till they have been introduced into the stove. Their stems are then firm, and, as Knight remarks, the plants possess within themselves a quantity of accumulated sap.

3. Gourds, species or varieties of the species of the genus *Cucurbita*, may be grown like drilled cucumbers, or trained against walls or on palings. Though occasionally used as esculents, they are regarded chiefly as curiosities, the fruit of some kinds being very orna-

mental. The *Succada* (*Cicader*, Cucurbita ovifera), or vegetable marrow, is a very useful sort, and in request for the table, being eaten, stewed with white sauce, or mashed like turnips. It may be raised in an exhausted melon-frame or pit; or sown under a hand-glass, and afterwards transplanted into a good aspect, and trained against a wall or trellis. The tender tops of any of the edible Cucurbitaceæ, boiled as greens or spinage, form a delicate vegetable.

4. The MUSHROOM (*Agaricus campestris*), though not properly an inmate of the Melonry, may appropriately enough, from the nature of its culture, be taken along with the plants grown in this department. It is a well-known fungus, a general favourite, and esteemed a delicacy during winter and the spring months.

Mushrooms used to be grown in ridges or prepared beds, in sheds, or covered with litter in the open air. About 1815, however, the German form of the mushroom-house was introduced into Britain by Oldacre, and is now in very general use. Its arrangement may be seen by inspecting the back part of the vinery, a section of which is given in fig. 28. Two tiers of boxes, three in each tier, and supported by a strong framework, are constructed round the whole house, with the exception of the spaces occupied by a door and two windows. The boxes may be from two feet and a half to three feet and a half broad, and about a foot deep. The house is supposed to be heated by hot water. In the centre *d* is a narrow pit, by which the house may be worked by means of fermenting litter instead of hot water, or in which rhubarb stalks may be forced. The windows are furnished with shutters to regulate the admission of light, much of which is not wanted; and they are moveable, to permit the ingress of air.

Mushrooms are propagated from what gardeners call *spawn*, and botanists *mycelium*, being a collection of matter resembling white mouldiness, crossed with vegetable threads. It may be obtained from old pastures the floors of disused stables, decayed mushroom beds, or purchased from nurserymen in the form of *bricks* charged with spawn. When once obtained, it may, like leaven, be indefinitely multiplied and preserved. If not to be otherwise procured, it may be produced, or apparently generated, by placing quantities of horse-dung and rich loam in alternate layers, and covering the whole with straw, to exclude the rain and air. Mushroom spawn commonly appears in the heap in about two months after the dung and earth have been laid together. The almost impalpable seeds seem to adhere to the grass, hay, or oats, on which the horse feeds, and to resist the action of the animal's stomach. The droppings of stall-fed horses, or of such as have been kept on dry food, are found preferable for this purpose.

The old method of growing mushrooms has been referred to above; and, as it has some conveniences, particularly for those who have not extensive means, it may be proper to give some account of it. Horse-droppings should be laid out from the stable into a very dry place, as free from straw or litter as possible. There they should be firmly trampled down with a man's feet, to prevent fermentation. The droppings from the horse-track of a thrashing-machine form an excellent material, in the spring time; for there the droppings are kept dry, and are thoroughly trodden by the horse's feet. Beds may then be formed two or three feet broad, and of any length. A layer of the droppings about eight or ten inches thick is first deposited, and covered with loamy earth to the depth of two or three inches; then another layer of droppings of the same thickness, covered like the former; and, lastly, a third layer, with its covering. The whole should grow narrower as it advances in height. When the bed is finished it is covered with straw, to protect it from rain and from the parching influences of the sun and wind. In ten days the bed will be ready for planting or spawning. Pieces of spawn bricks are then inserted in the sloping sides of the bed, about four or five inches asunder. A layer of loam is next placed over the bed, and the whole is covered with a thick coat of straw. When the weather is temperate, mushrooms will appear in about a month after the bed has been made; but at other times a much longer period may elapse. The principal things to be attended to are, to preserve a moderate state of moisture, and a proper degree of warmth; and the treatment at different seasons must vary accordingly.

Of several other methods of raising mushrooms, Oldacre's, already referred to, may deserve to be particularised. In forming the compost, fresh short dung from a stable, or from the path of a horse-mill, is procured. To this is added about a fifth part of sheep-droppings, or of the cleanings of a cowhouse, or of a mixture of both. The whole ingredients are thoroughly mixed and incorporated. A stratum of the prepared mixture, about three inches thick, being deposited in the boxes already described, is beat together with a flat wooden mallet. Another layer is added, and beat as before; and this is repeated till the beds be rather more than half a foot thick, and very compact. The boxes are then placed in the mushroom-house, or in any out-house where a slightly increased temperature can be commanded. A degree of fermentation generally takes place; but if heat be not soon perceptible, another layer must still be added, till sufficient action be excited. When the beds are milk-warm, or between 80° and 90° Fahrenheit, some holes are dibbled in the mass to receive the spawn. The holes are left open for some time; and when the heat is on the decline, but before it be quite gone, a piece of spawn-brick is thrust into each opening, and the holes are closed with a little compost. A week afterwards the boxes are covered with a smooth coating, two inches thich, of rich loamy mould mixed with about a fifth part of horse-droppings. The apartment is now kept as nearly and equably at 55° Fahrenheit as circumstances will allow. When the boxes become dry, a little soft water may be used, but sparingly and with circumspection, and instead of watering directly on the surface of the bed, it is better to spread some hay over it, and to sprinkle the hay. The more that free air can be admitted, the flavour of the mushrooms is the better; but the exclusion of frost is indispensable. If a number of boxes have been prepared at first, a few only at a time may be covered with mould and brought into bearing, the rest being covered and cropped in succession, as mushrooms may be in demand.

In a tract on the artificial growth of mushrooms, Mr Edward Callow describes a method in which the pits are wrought by means of dung heat. His structure somewhat resembles Atkinson's melon-pit, only the roof is covered with thatch, and a suite of air-flues is formed within the interior of the pit, with branches crossing the principal bed which occupies the floor. Linings of fermenting litter are applied on the exterior of the house at the back and front. The atmosphere in the pit, in the earlier stage, is kept at 55° to 65° Fahrenheit, and when the bed is in full bearing, about 70°. The other details of this method scarcely differ from those of Mr Oldacre's.

There are other methods of raising mushrooms adopted by Mr Sellers, Mr Hawkins, Mr Patrick, Mr Forsyth, the Baron D'Hoogvorst, and others, which our space precludes us from describing.

KITCHEN GARDEN.

In this department those plants are cultivated which, after being subjected to various culinary processes, are used at the dinner-table, as articles of food. We shall class them in groups, enumerating the kinds nearly in the order of their importance, each, for the sake of precision, being accompanied by its botanical name.

I. THE CABBAGE TRIBE.

The *Brassica oleracea*, L., from which have sprung all the varieties under this head, is a plant indigenous to our rocky shores; but no one, seeing it waving its foliage in its native habitat, could possibly anticipate that it would ever appear in our gardens, disguised as the ponderous drumhead or sugar-loaf cabbage, or on our tables as the delicate cauliflower and broccoli. The cultivated varieties are numerous, and may be thus classified: 1. Hearting Cabbage; 2. Open Cabbage or Cale; 3. Borecole, Greens, or Scotch Kail; 4. The Savoy; 5. Brussels Sprouts; 6. Turnip-rooted Cabbage or Kohl-Rabi; 7. Cauliflower; 8. Broccoli.

1. THE HEARTING CABBAGE.

In this variety the leaves are gathered into a close head, surrounded by a few loose leaves. The economical uses of this vegetable are well known. Its principal subvarieties are the following:—

1. Dwarf.
2. Dwarf York.
3. Nonpareil.
4. Large York.
5. Dwarf Screw.
6. Emperor.
7. Paington.
8. M'Ewen's.
9. Vanack.
10. St John's.
11. Small Pomeranian.
12. Large Pomeranian.
13. Battersea.
14. Imperial.
15. Sugar-Loaf.
16. Large Drumhead.
17. Dwarf Drumhead.
18. Red Drumhead.
19. Scotch Gray.
20. Red Dutch.
21. Dwarf Siberian Cut-leaved.

The first ten are well adapted for early crops; the next five for intermediates, and the rest for late crops.

The Cabbage is propagated from seed, which may be sown in beds four feet wide, and covered with a thin layer of earth. The proper seasons for this operation are the middle of August, the beginning of March, and midsummer. By observing these times, and employing different sorts, the succession may be kept up throughout the year. For the early spring crops, the late-sown plants are, in October, transferred from the seed-bed to some open and well-manured ground, where they are arranged in rows two feet asunder. The principal supply may be put out in February, affording the larger sorts more width between the rows. The crops sown in spring are planted out in May and June. For subsequent culture, all that is necessary is to keep the ground clear of weeds, and to draw up the soil about the stems. In some situations watering in summer is beneficial.

In many places on the continent sauerkraut is prepared in autumn, by shredding down the heads of the Drumhead cabbage, and placing in a cask alternate layers of the cabbage with salt, pepper, and a very little salad oil; and then compressing the whole.

The term *Colewort* (a name formerly given to a variety intermediate between the Hearting and Open Cabbage) is applied to several early varieties, at the period of their growth, when the hearts are only partially formed. The object is to have them with open or slightly-closed hearts. Two sowings are made, in the middle of June and in July, and the seedlings, when they acquire sufficient strength, are planted out in lines, a foot or fifteen inches asunder, and eight or ten inches apart in the rows.

The Red Cabbage, of which the Dutch or large red is the most common variety, is much used for pickling. It is sown in August and in spring, along with the white varieties, and the culture is in every respect the same.

2. OPEN CABBAGE OR CALE.

Those cabbages which do not form hearts we place under this head. They are sown in May, planted out in August, and come into season early in the following spring. The best kinds are the

Portugal Cabbage.
Braganza.
Thousand-headed.
Tree or Cow Cabbage, or Jersey Cale.

3. BORECOLE, GREENS, OR SCOTCH KAIL.

The principal subvarieties are the following:—

Dwarf and Tall Green curled.
Do. do. Red curled.
Delaware Greens.
Buda Kail.
Jerusalem Kail, or Ragged Jack.
Woburn Kail.

The seed is sown, at various times, from February to May, and the seedlings are planted out in moist weather during summer, in rows two feet asunder. The Buda Kail is sown in May, planted out in September, and, being hardy, affords a supply in the following spring. The Woburn Kail, being nearly a perennial, may readily be propagated by cuttings, six inches long, in any of the spring months.

4. THE SAVOY.

This variety forms into a close head, but is distinguished by the wrinkling of its leaves. It is a very useful vegetable during the winter months, being highly relished by most people. The principal subvarieties are the Large Green Curled, the Dwarf Curled, Green Globe, Cape, Victoria triple-curled, and Large Yellow Dutch. The seed is sown in autumn and in the end of spring; and two plantings may take place, in April, and in June or July.

5. BRUSSELS SPROUTS.

This vegetable is allied to the foregoing, but does not close or "cabbage." From the axillæ of the stem-leaves proceed little rosettes or sprouts, which resemble savoy cabbages in miniature, and form a very delicate morsel. The seed should be sown in spring, and the seedlings planted out before midsummer, during showery weather. In October the plants should have additional earth drawn to their roots, to firm them, and save them from being destroyed by frost. The earliest sprouts become fit for use in November, and they continue good, or even improving in quality, till the month of March following. Mr Van Mons of Brussels mentions (*Lond. Hortic. Mem.*, vol. iii.), that by successive sowings the sprouts are there obtained for the greater part of the year. In spring, when the plants have a tendency to run to flower, their growth is checked by lifting them, and replanting them in a slanting direction, in a cool, shady situation.

6. TURNIP-ROOTED CABBAGE, OR KOHL-RABI.

There are two kinds, one swelling above ground (Chou-rave), the other in it (Chou-navet). There is nothing peculiar in the culture, unless that, in the case of the first mentioned, the earth should not be drawn so high as to cover the globular part of the stem, which is the part used. The seed may be sown in the beginning of June, and the seedlings transplanted in July; the vegetable is thus fit for use at the approach of winter. Of the Chou-rave there are eight subvarieties, but only two of the other.

7. CAULIFLOWER.

This is cultivated for the sake of the flower-buds, which form a large dense cluster or head, and afford one of the most delicate products of the kitchen garden. There are three varieties, the Early, the Late, and the Walcheren; but these seem to present scarcely any well-marked distinction; the earliness or lateness depending on the time of sowing. Of late a sort called the Large Asiatic has come much into use.

The sowing for the first or spring crop is made in the latter half of the month of August; and, in the neighbourhood of London, the growers adhere as nearly as possible to the 21st day. A second sowing takes place in February on a slight hotbed, and a third in April or May.

The cauliflower being tender, the young plants require protection in winter. For this purpose they are sometimes pricked out in a warm situation at the foot of a wall with a southern exposure, where, in severe weather, they are also covered with hoops and mats. Perhaps a better method is to plant them thickly in the ground under a common hotbed frame, and to secure them from cold by coverings, and from damp by giving air in mild weather. We have heard of cauliflower plants in the open border being protected during severe snowstorms by the simple expedient of heaping snow over them to the depth of eighteen inches or two feet. For a very early supply, it is useful to be at the pains of potting a few scores of plants; these are to be kept under glass during winter, and plunged out in spring, defending them with a hand-glass, and watering them when needful. Sometimes, as in market-gardens, patches of three or four plants are sheltered by hand-glasses throughout the winter in the open border. It is advantageous to prick out the spring-sown plants into some sheltered place, before they are finally transplanted and committed to the open ground in May. The later crop, the transplantation of which may take place at various times, is treated like early cabbages. Cauliflower succeeds best in a rich soil and warm situation. After planting, all that is necessary is to hoe the ground and draw up the soil about the roots.

It is found that this vegetable, being induced to form its large and crowded clusters of embryo flowers in the autumn, may be kept in perfection over winter. Cauliflowers which have been planted out in July, will be nearly ready for use in October. Towards the end of that month, the most compact and best shaped are selected and lifted carefully with the spade, keeping a ball of earth attached to the roots. Some of the large outside leaves are removed, in order that the plants may occupy less room, and, at the same time, any points of leaves that immediately overhang the flower are cut off. Where there are peach-houses or vineries, the plants may be arranged in the borders of these, pretty closely together, but without touching. Or they may be placed in the same manner in hotbed frames; in mild, dry weather the glass-frames are drawn off, but they are kept close in rain; and in severe frost they are thickly covered with mats. In this way cauliflowers may be kept in a very good state for several months.

8. BROCCOLI.

This plant has a close affinity to the cauliflower, being, like it, of Italian origin, and differing chiefly in the greater hardiness of its constitution. The subvarieties are numerous, and exceedingly diversified,—some producing their heads in autumn, some in winter, and others in spring. The following are those which are most in repute at present:—

1. Early Dwarf Purple Cape.
2. Early Dwarf White Cape.
3. Gillespie's Early.
4. Grange's Early.
5. Walcheren.
6. Hammond's White.
7. Large Imperial Winter.
8. Stewart's Edinburgh Early White.
9. Addison's Early White.
10. Snow's Superb White.
11. Early Sprouting Purple.

12. Wilcox's Late White.
13. Gigantic White, or Mammoth.
14. Knight's Protecting.
15. Sulphur, or Portsmouth.
16. Chappel's Cream-coloured.
17. Late White Tartarian.
18. Late Dwarf Purple.
19. Dwarf Danish.

Nos. 1 to 5 are for autumn cutting, Nos. 6 to 11 for winter, and Nos. 12 to 19 for spring use. The autumnal sorts should be sown in the middle of April. As the plants acquire strength they are shifted into the open ground, where they are placed in lines two feet apart. The Cape varieties are of great excellence, being of a delicious flavour when dressed; but, on account of the plants being apt to start into flower, their cultivation has in many places been neglected. With proper management, however, this tendency may be overcome. The sowings may be made on any border of light soil, scattering the seed very sparingly. In about a month the plants may be transferred directly into a quarter consisting of sandy loam, well enriched with rotten dung. The winter sorts should be sown a week or two later, for a succession; then planted in pots, directly from the seed-bed, and sunk in the open ground till the heads be formed. In the end of November they should be placed under a glass-frame, where very good broccoli may be produced during the severest winter weather.

The spring varieties are extremely valuable, as they come into use at a season when the finer vegetables are scarce. They are sown from the middle of March till the end of May, and afford a supply during April and May of the following year. The Late White Tartarian bears a great resemblance to cauliflower, and often passes for it.

To obtain seed of the Brassica tribe, the most genuine and characteristic specimens of the different varieties should be selected in autumn, in such a state of advancement as that they will flower as early as possible in the following spring. They should be planted in an open situation, and kept as far distant from other kinds of the same tribe as may be. As they are very liable to *cross* or hybridize, it is perhaps better, except in the case of some favourite variety, to procure supplies from a respectable seedsman, from whom they are almost uniformly to be had genuine—the extensive seed-growers being at great pains to prevent intermixture of crops.

II. LEGUMINOUS PLANTS.

Under this section we class, 1. The Pea; 2. The Bean.

THE PEA.

Of the pea (*Pisum sativum*) there are two principal varieties, the Field Pea, and the Garden Pea. The latter alone requires our attention here. Its subvarieties are endless; but the following may be enumerated as those most deserving of cultivation:

1. Prince Albert Frame.
2. Early Emperor.
3. Early Warwick.
4. Bishop's Long-podded.
5. Fairbaird's Surprise.
6. Spanish Dwarf.
7. Groom's Dwarf Blue.
8. Tall Marrowfat.
9. Dwarf Marrowfat.
10. D'Auvergne.
11. Bedman's Green Imperial.
12. Blue Prussian.
13. White Prussian.
14. Woodford's Green Marrow.
15. Knight's Dwarf Marrow.
16. Knight's Tall Marrow.
17. British Queen.
18. Sugar, or Eatable-podded.

The first five are suitable for early crops, and the others for successional supplies. In the Sugar Pea, of which there are two sorts (the tall and dwarf), the inner tough, filmy lining of the pod is absent: the young legumes of these may therefore be used like kidney-beans, and form an agreeable dish.

The first crop of peas is sown about the beginning of November, in front of a south wall; and these, after they have appeared above ground, are defended by spruce-fir branches, or other spray, throughout the winter. In January and February other sowings are made, and sometimes the seed is put into flower-pots and boxes, and the young plants afterwards plunged out in spring, either singly or two or three together, taking care to keep a portion of earth adhering. From the end of February moderate sowings should be made twice a month till the middle of August, thus insuring a supply of successive crops of delicate green peas. Peas are sown in rows from three to five feet asunder, according to the height which the different sorts are known usually to attain. As they grow up, the earth is drawn to the roots, and the stems are supported with stakes, a practice which, in a well-kept garden, is always advisable, although it is said that the early varieties, when recumbent, arrive sooner at maturity. Groom's Dwarf, though prolific, is so humble as not to require stakes. When germinating, or when just rising through the ground, peas are greedily devoured by sparrows and other small birds. Threads of white worsted spread along the lines of the young peas, frighten the depredators fully better than scarecrows or strings of feathers; but perhaps the simplest and most effectual remedy is to throw over the peas a slight covering of soil; for by the time the young plants have penetrated this, they are beyond the attack of the birds.

The early crops come into use in May and June, and, by repeated sowings, the supplies are prolonged to the beginning of November. Peas grown late in autumn are subject to mildew, to obviate which, Knight proposed the following method :—The ground is dug over in the usual way, and the spaces to be occupied by the future rows of peas are well soaked with water. The mould on each side is then collected, so as to form ridges seven or eight inches high, and these ridges are well watered. On these the seed is sown in single rows in the beginning of June. If dry weather at any time set in, water is supplied profusely once a-week. In this way, the sap which is prepared in the summer is expended in the autumn; the plants continue green and vigorous, resisting mildew, and not yielding till subdued by frost.

THE BEAN.

Of the garden bean (*Faba vulgaris*), amongst many varieties, may be mentioned—

Marshall's Early Dwarf Long-Pod.
Early Mazagan.
Dwarf Fan, or Cluster.
Royal Dwarf.
White Long-Pod, or Sandwich.
Child's Early Long-Pod.
Hang-Down Long-Pod.
Green Long-Pod.
White-Blossomed Long-Pod.
Broad Windsor, or Spanish.
Green Windsor.
Toker.

The Mazagan and Marshall's Dwarf may be sown in November, and defended during winter in the same manner as early peas, but it is more difficult to preserve them from being destroyed by the frost. The same sorts should be sown again in January and February. In March, the Dwarf Cluster and Long-pods may be put in the ground for a general crop, and subsequently the Windsor and the Toker. For a small garden the Early Long-pods are most desirable, being the most prolific. The White-blossomed is a variety of some merit, and when the pods are taken at an early stage, they have little of the peculiar bean flavour, or only enough to render them pleasant. The Royal Dwarf is remarkable for being exceedingly productive. During the growth of the bean crop, all the culture that is necessary is, that the earth be drawn up about the roots. Topping the plants is usually practised, being found to promote the filling of the pods.

KIDNEY-BEAN.

Under this general title are included the common kidney-bean (*Phaseolus vulgaris*) of many varieties; and also the Scarlet Runner (*P. multiflorus*). Kidney-beans are the *haricots* of the French, who enumerate upwards of 200 varieties. The sorts usually cultivated in this country are—

Early Yellow.
Early Red-Speckled.
Early Negro.
Early White.
Fulmer's Early.
Cream-Coloured.
Black-Speckled.
Brown-Speckled.
Scarlet Runner.
Dutch White Runner.

The first four are the earliest; the others are better fitted for a general crop. As the plant is of tropical origin, our climate is scarcely suitable for the extensive production of the ripe beans, which are the principal object in France and Italy: but the immature pods are produced copiously, and are most in demand in this country.

It is seldom advantageous to sow kidney-beans in the open ground before the middle or end of April; after which period successive sowings may be made every fourteen days to the end of July. The plants are grown in rows, two feet apart, and the earth is carefully drawn to the roots. When, owing to the nature of the season, great quantities of pods come at one time, the superfluous produce should be gathered for pickling. Kidney-beans are well adapted for forcing, in hotbeds, or in hothouses; the climate of the peach-house, when it can be obtained, being considered the best. The sowings may begin in January: they are made in pots, and a supply may be thus obtained in the months of March, April, and May. The Dwarf speckled is often used in hothouses, and the Early white in hotbeds. But perhaps the best of all for this purpose is Vibert's variety or the Black Haricot of Flanders, which is naturally of a very dwarfish growth; flowers early; with smooth and straight pods, of a very lively green colour. For haricots verts this is decidedly preferable.

III. ESCULENT ROOTS.

THE POTATO.

This well-known plant (*Solanum tuberosum*) is a native of the elevated regions of equatorial America. It was introduced into Europe about the middle of the sixteenth century, but remained little known or regarded for full two hundred years: it is now so generally cultivated as to have effected almost an economical revolution in this country. Most of the original British sorts have been derived from Ireland. Its multitudinous varieties almost set enumeration at defiance, and new ones are appearing and disappearing every year. By much the most correct list of the varieties now in cultivation is to be found in Peter Lawson & Son's useful work, "Synopsis of the Vegetable Products of Scotland." They are arranged in various classes, out of which we shall select a few names of the more esteemed sorts. The first class consists of the earliest garden varieties of dwarfish growth, and therefore well adapted for forcing, such as Fox's Early Delight, and the Early Kidney. The next class contains those very early kinds, of taller growth, which yield the first garden crop; including the Hopetoun Early, Harold's Early, Invermay Early, the new Elm-leaved Kidney, and Ash-leaved Early and Early Seedling. Of these the Hopetoun is perhaps the best: the tubers are round, dry, early, and of tolerable size; but in all the kinds, the mealiness and earliness necessarily depend a good deal on soil, situation, and the quality of the season. The third class embraces those which generally form the principal garden crop, and includes the Prince of Wales Early, tall American Early, Shaw's Early, Taylor's Forty-fold, and Matchless Kidney. For cultivation in the home-farm, the Edinburgh Dons, and the Perthshire Reds (of which last there are two or three subvarieties), have not yet been surpassed. The culture of the late sorts properly belongs to the farm, and when the gardener has to take them under his care, he will find it best to adopt such as are common in the agriculture of the district. What is called the Everlasting Potato is a late sort, the tubers of which have the property of retaining, during winter, the delicate waxy flavour of young potatoes. They are left in the ground, but covered with litter to prevent the access of frost. It may here be remarked, that if the tubers of any good late variety, such as the Edinburgh Don or the Staffold Hall, be buried in the earth so deep as to prevent vegetation, and kept there till the beginning of autumn, or if their growth be in any way retarded, and if they be planted at that season of the year, young potatoes may thus be procured during the winter season, by merely preventing the access of frost with a covering of litter.

Potatoes are commonly propagated by dividing the tubers, leaving to each cut one or two eyes or buds. The sets are then planted by the aid of a dibble or spade, in rows at a distance varying from fifteen inches to two feet. It was suggested by Knight, and his views have been amply confirmed by experiment, that by planting whole tubers, and at great distances, a larger produce might be obtained. He proposed to leave four feet between the rows, a distance which, except with the larger varieties, was found to be unnecessarily great. An experienced horticulturist in Scotland states, that by planting whole tubers, and by leaving in the case of dwarfs two feet, and in the tall varieties two feet and a half, between the rows, a return from one-third to one-half more was obtained than could be had from the old method. Of course more tubers are required for planting, but these bear no proportion to the great increase which results ; and besides, early potatoes at the planting season being unfit for table use, there is little economy in sparing them.

The earliest crops should if possible be placed in a light soil, and in a warm situation, and should be planted about the middle of March. Sometimes the eyes of the tubers are made to spring or vegetate on a hotbed, and the plants are put out as soon as the leaves can bear the open air. Perhaps it is better, as recommended by Mr Saul of Garstang, to promote incipient vegetation in some warm place, as a house or greenhouse, by laying a woollen cloth or some other covering over them. When the sprouts are about two inches long, he plants them out toward the end of March, and thus procures young potatoes in seven or eight weeks. In some places, the plants are forced to some extent, by being protected in frames covered with oiled paper. A secondary planting of tubers should be made before the middle of April. When the stems are a few inches above ground, the earth should be drawn to them ; an operation, however, which, while it improves the crop, delays its maturity for two or three weeks. Knight recommends removing the flowers as they appear, and states that by this means the produce is increased by a ton per acre. The fine early varieties, however, scarcely produce any flowers.

An important fact in the cultivation of the potato was observed about the year 1806, by the late Mr Thomas Dickson of Edinburgh, viz., that the most healthy and productive plants were to be obtained by employing as seed-stock unripe tubers, or even by planting only the wet or least-ripened ends of long-shaped potatoes; and he proposed this as a preventive of the well-known disease called the *Curl*. This view was confirmed by Knight. An intelligent writer in the *Gardener's Magazine* suggests a method by which sprouting of the eyes is accelerated. He takes up the seed potatoes a considerable time before they are ripe, and exposes them for some weeks to the influence of a scorching sun. The resulting crop is at least a fortnight earlier; but it is not said how this practice affects the curl. It is not thought necessary here to enter on the subject of the very general potato disease which first made its appearance in 1845. Notwithstanding numerous inquiries and publications, nothing satisfactory, either as to cause or cure, has been established, and, fortunately, the evil is gradually disappearing.

The forcing of early potatoes on hotbeds has long been practised; but it is attended with considerable trouble and expense. Small supplies of young waxy tubers are now often produced during winter, in boxes placed in a mushroom-house, or in a common cellar, if free from frost. In October, old potatoes are placed in layers, alternating with a mixture of tree-leaves and light mould. Vegetation soon proceeds; and there being no opportunity for the unfolding of stems and leaves, the energies of the plants are expended in the production of young tubers. Before midwinter these often attain the size and appearance of early potatoes; but they are much inferior in quality, being watery and of little flavour.

JERUSALEM ARTICHOKE.

This plant (*Helianthus tuberosus*) or tuberous-rooted sunflower, is a native of Brazil, and derives its epithet *Jerusalem* from a corruption of the Italian *Girasole*, sunflower, and *Artichoke*, from the resemblance, in flavour, which its tubers bear to the floral receptacles or *bottoms* of the artichoke. It is propagated by means of its tubers in the manner of potatoes. In March they are planted out in rows three or four feet asunder, and in Autumn the new tubers are fit for use. For the sake of convenience, it is advantageous to store them, though the roots are hardy enough to bear the winter frosts. Some, indeed, allow them to remain in the ground, and dig them up when required. In this way a sufficient number of sets are generally left in the ground, and the stalks are thinned into rows in summer; but this is a slovenly mode of treatment, and seldom produces well-flavoured crops.

THE TURNIP.

The turnip (*Brassica Rapa*), like the potato, has, to a great extent, migrated to the fields, and become the care of the husbandman more than of the gardener. The following are the most esteemed garden sorts:—

Early White Dutch.
Early Stone.
Green-topped White.
Long White.
Yellow Maltese.
Dutch Yellow.
Aberdeen Yellow.
Teltow.

Besides these, the *Navet* of the French (*Brassica Napus*, var. *esculenta*) is occasionally cultivated, and more frequently the *Swedish Turnip* or Rutabaga (*Brassica campestris* var. *Napo-brassica*), which is a most excellent winter sort, though it belongs more properly to the farm. For early crops, the white Dutch is the principal variety; the other white sorts, and the beautiful yellow Maltese, are useful in summer and in the beginning of autumn. The yellow Dutch being capable of enduring a considerable degree of frost, affords the most appropriate winter supply. The Teltow, or French turnip, is remarkable for being high-flavoured, and is used only for seasoning to soups or stews.

Turnips succeed best in a rich, well-worked soil, of a light or medium quality. The first sowing is made about the end of March, in a warm situation; and it is usual to put in additional sowings, once a fortnight or three weeks, till the end of August. The early crops are sown *broadcast*, and the later in drills about a foot asunder. After the plants have shewn a rough leaf or two, they are thinned out, being left at the distance of eight or ten inches in the drill; and the ground is hoed and kept free from weeds. As turnips which have stood the winter throw up their seed-stalks early in spring, after which their roots become stringy, and are much deteriorated, it is useful to store the turnips in the winter, keeping them in a close place, and covering them with straw.

A small sowing may take place so late as the middle of September; and if the winter prove mild or open, *young* turnips of excellent flavour may thus be procured in the months of January and February. The best sort for this late sowing is the Dutch yellow, which (as already hinted) resists the cold and inclement weather better than the white. For this winter crop a liberal application of stimulating manure, such as rape-cake and pigeon-dung, was recommended by the late Mr Stuart of Pinkie garden, who sowed in drills a foot asunder, and thinned out the plants to six inches apart in the drills. A sheltered border was preferred; but no other artificial protection was given; and his success was complete.

The young plants, while in the seed-leaf, are often destroyed by a small beetle called the turnip-fly (*Haltica nemorum*). Many remedies have been proposed: it has been found beneficial to dust the rows with quicklime; but perhaps the best precaution is to sow thick, and thus insure a sufficient supply both for the insect and the crop. The insect soon ceases to feed, and disappears.

THE CARROT.

The carrot (*Daucus Carota*) is one of our native Umbelliferæ, but has been much transformed by cultivation; the root swelling and becoming succulent and of agreeable flavour. The best varieties are the Early Horn or Dutch, and the Long Orange; the former for early, the latter for general cultivation. The Altringham is in great repute: it is distinguished by a considerable portion of the root remaining above ground, which consequently assumes a greenish hue where so exposed. The carrot likes a light, deep, fresh soil, in which it may be at liberty to push down its long spindle-shaped roots. A few Early Horn carrots may be sown in February on a moderate hotbed. In the beginning of March, the same sort may be sown in the open air. In April, the Orange variety may follow as a general crop: it succeeds best in drills. The *Long White Carrot* is of delicate flavour, easily cultivated, but does not keep well. In many old gardens, the early plants are liable to the attacks of a small grub, the larva of some insect; it is therefore a useful precaution to sow a moderate crop of the Early Horn variety in July. After sowing, it is only necessary to thin the plants, and keep them clear of weeds. The roots are stored in winter in the manner of turnips.

THE PARSNIP.

The parsnip (*Pastinaca sativa*) is now less cultivated than it was in Catholic times, when it was a favourite accompaniment to dried fish in Lent. To some its flavour is not agreeable; but it is a very nutritious vegetable, and of easy digestion. Like the carrot, its root is long and tapering, differing chiefly in being of a whitish colour. Its culture is also very much the same. There is a variety with short roundish roots, called the Turnip-rooted Parsnip, very well suited for garden culture.

THE BEET.

Red beet (*Beta vulgaris*) is a biennial plant, a native of the shores of the south of Europe. The boiled root is eaten cold, in thin slices, either by itself or as a salad: it is also often used as a pickle. The varieties are numerous, but the most common are the Long-rooted, the Short or Turnip-rooted, the Bassano, and the Dark Red beet. There is also a fine French variety called Castelnaudry, from a town in Languedoc.

Red beet prospers in a rich deep soil, not recently manured, and which has been well pulverized by the spade. During April the seeds may be sown in drills, fifteen inches asunder, and the plants are afterwards to be thinned to eight inches from each other in the lines. In the northern parts of the island, the roots are stored in winter, care being taken not to break them or cut off the leaves too closely, as they bleed when injured, and lose colour.

THE SKIRRET.

The skirret (*Sium Sisarum*) is a native of China, now seldom seen in our gardens. Its tubers are used like parsnips. It is a perennial, and may be propagated by separating the roots in spring; but it succeeds better by annual sowings, which may be made in April.

SCORZONERA AND SALSAFY.

Scorzonera (*Scorzonera hispanica*) and salsafy (*Tragopogon porrifolius*) are generally associated together in gardens, and are now less cultivated than they deserve. The roots are used in soups, and sometimes as dressed side-dishes. They are sown in lines, and treated like the crops of red beet or parsnip.

THE RADISH.

The radish (*Raphanus sativus*) is a native of China. There are two principal varieties, the spindle-rooted and the turnip-rooted radish; and of these the subvarieties are numerous. The following may be mentioned:—

Spindle-shaped.	Round-shaped.
Short-topped Scarlet.	White Turnip.
Scarlet Salmon.	Yellow Turnip.
Long White.	White Spanish.
White Russian.	Black Spanish.

The first two and the white turnip radish are best suited for early crops, the scarlet salmon for summer, the yellow turnip for autumn, and the white and black Spanish for winter. There are, besides, oval or oblong summer radishes, both white and red.

Some cultivators sow their earliest crop in November, in a warm situation, at the foot of a wall or in front of a pinery, and continue sowing once a-month, if weather permit, during winter. Others grow their first radishes under frames, aiding vegetation by a slight bottom-heat. As the season advances, successional supplies are sown once a-fortnight. From the middle of July to the middle of September the turnip-radishes are sown from time to time; and on the approach of frost they may be stored up in sand, and kept throughout winter.

OXALIS.

Oxalis roots (*Oxalis crenata*) have of late years been cultivated for the table in this country. The plant produces tubers at the root, somewhat in the manner of the potato; but they are of small size, seldom exceeding that of a walnut. By cultivation, however, by manuring, laying down, earthing up, watering, and other helps known to horticulturists, considerable increase of size in the tubers may be effected. From the mode of culture adopted by the most intelligent gardeners, we conclude that a rich light soil is the most proper; that it is useful to forward the plants in a hot-bed, in the way practised with early peas, so as to have them ready to transplant by the middle or end of May; that in planting out, they should be inserted in a sloping position, so that a considerable portion of the stem may be covered by the soil; that earthing up, or drawing up additional soil to the stems in June and July is important; and that laying down the stems horizontally in August, and covering them slightly (to the depth perhaps of two inches) with mould, tends greatly to promote the productiveness. It should be observed that the tubers continue to swell in size till November, or till stopped by frost. It is believed that the largest tubers, having full eyes or buds, yield the strongest plants; and, therefore, a portion of the largest should be reserved for seed-stock. Cut sets of these large tubers are, by some cultivators, preferred to whole tubers. The rest, from the size of a filbert to a walnut, go to the cook. The mode of dressing for table is simple. The tubers, after being cleaned, are boiled for about ten minutes, or till they be slightly softened; and they are then served up with white sauce. Some persons merely put them into boiling water for a few minutes; then, pouring off the water, transfer them to a covered saucepan; and place the pan upon hot cinders, drawing some of these to the lid; in this way the tubers are rendered more dry or mealy. They have a pleasant flavour; somewhat resembling a new potato, with the additional zest of a nut or kernel; but also with a certain degree of acidity. The oxalis comes from the same country that afforded us the potato, and has been extolled as likely to rival it; but this it will never do: a dish of oxalis may form an agreeable variety and adjunct, but no more; bearing to the potato such relation as sea-kale does to asparagus. It may be added, however, that the oxalis is, in other respects, a useful vegetable. The leaves may be used as salad, and they constitute, indeed, the principal salad at Lima. The shoots and young branches are found to make an agreeable purée, having the woodsorrel flavour; and the larger stems have been used in tarts, in the manner of rhubarb stalks, and been found more tender. The *Oxalis Deppei* tubers are hardy, prolific, and excellent when properly cooked; being free of the acidity of that of *O. crenata*.

TUBEROUS-ROOTED INDIAN CRESS.

The tuberous roots of a lately introduced species of Indian cress, *Tropæolum tuberosum*, were, for some time, in vogue, being praised as having, when boiled, a "very delicate flavour, resembling the richest asparagus." The plant is readily multiplied by cuttings during the summer months; and the young plants thus produced furnish a crop of tubers late in the autumn of the same year. But these have not maintained their character; most people regarding their sharp anise flavour as far from delicate. They are better adapted for being used as a pickle.

IV. ALLIACEOUS PLANTS.

THE ONION.

The onion (*Allium Cepa*) is too well known to require description; having been cultivated in this country from time immemorial. Among the varieties may be enumerated:—

Strasburg.
French Yellow.
James's Keeping.
Globe.
Silver-skinned, large and small.
White Portugal or Reading.
Nocera.
Blood Red.
Tripoli or Giant.
Potato, Tree, and Pearl Onion.

Besides these, the Welsh Onion or Ciboule (*Allium fistulosum*), a native of Siberia, is sometimes grown for scallions. For a general crop, the Strasburg, French Yellow, and James's Keeping varieties may be esteemed the best, as they are hardy and keep long. The White Portugal grows to a large size, is mild in flavour, but does not keep well. The small Silver-skinned is chiefly used for pickling. The Nocera, introduced by Peter Lawson & Son in 1843, is not only of good quality, but possesses the advantage of not being so apt to send up flower-stalks as the other kinds.

The onion affects a light, rich, well-worked soil, which has not been recently manured. The principal crop may be sown in the course of the month of March, according to the state of the weather and the dryness of the ground. Onions are cultivated in beds, four or five feet in width, and are regularly thinned, hoed, and kept free from weeds. About the beginning of September the crop is ripe or ready for lifting, which is known by the withering of the leaves; the roots are taken up, and, after being well dried in the open air, are stored in a garret or loft, where they may be perfectly secured from damp.

Towards the end of August a secondary crop is sown, to afford a supply of young onions or *scallions*, as they are called, in the spring months. The Strasburg and White Portugal may be used for this purpose. Those which are not required for the kitchen may be allowed to stand, and if the flower-bud be picked out on its first appearance, and the earth stirred about them, they will frequently produce bulbs equal in size and quality to the large ones that are imported from the Continent.

Some eminent horticulturists have strongly recommended the transplanting of onions. Knight recommends sowing the White Portugal onion in May under the shade of a tree, where the plants remain of a diminutive size, during the autumn and winter, and are planted out in the succeeding spring. Other cultivators collect all the minute bulbs of the ordinary crop, and use them in the same way. The late Mr Macdonald, Dalkeith Park, was in the practice of confining his operations to one summer. He sowed in February on a slight hotbed, or sometimes merely under a glass-frame. In the first or second week of April, according to the state of the weather, he transplanted the young seedlings in rows, eight inches asunder, and at the distance of four or five inches in the row. Previous to planting, the roots of the seedlings were dipped in a puddle of one part of soot to three parts of earth, an expedient which was found useful in guarding the transplanted onions from the attacks of the wire-worm. He found that onions thus treated attained a large size.

The POTATO-ONION is propagated by the lateral bulbs, which it throws out, under ground, in considerable numbers. It may be planted about midwinter, and will ripen early in summer. Its flavour is not unpleasant; but the plant being rather troublesome in cultivation, is not likely to supersede the common onion.

The TREE-ONION, introduced from Canada, is a viviparous variety producing small bulbs in place of flowers; but the bulbs are strong-scented.

The PEARL ONION, of recent introduction, and hitherto little known, produces clusters or small bulbs at the root. These little bulbs are of a fine white colour, like the silver-skinned, and very fit for pickling.

THE LEEK.

This plant (*Allium Porrum*) is a native of Switzerland, but has probably been cultivated in this island for many centuries. The varieties are the Narrow-leaved or Flanders leek, the Scotch or Flag-leek, and the Broad-leaved or Tall London leek. Of these, the Scotch leek is considered as the most hardy; and the Musselburgh variety is preferred.

Leeks are sown in beds in spring; and in June or July are planted out in rows fifteen or eighteen inches apart, and six inches asunder between the rows. The tips of the fibrous roots are trimmed before planting. When the weather is moist, it is found beneficial merely to lay the plants into the hole made by the dibble, without closing the earth upon it, the stem being by this means encouraged to swell out and fill the hole.

THE SHALLOT.

The shallot (*Allium ascalonicum*) is a native of Palestine. It is much used in cookery for high-flavoured soups and gravies, and is sometimes put into pickles. A variety called the Long-keeping is preferred. It is propagated by the cloves, the smallest being selected for that purpose, and planted in October or November. Some recommend the mixing of soot with the manure, as a protection against the attacks of maggots, by which this plant is greatly infested. Late autumn planting, however, is found the best expedient, as the bulbs are ripe and lifted next summer before the larvæ commence their depredations.

THE GARLIC AND ROCAMBOLE.

The garlic (*Allium sativum*) and rocambole (*Allium Scorodoprasum*), though common ingredients in continental cookery, are comparatively seldom used in this country. A few rows will generally be found sufficient. They are propagated by offsets or cloves from the bulbs, or by the bulbils which grow on the flower-stem.

THE CHIVE.

The chive or *cive* (*Allium Schoenoprasum*), a pretty little native plant, is used occasionally as salad and for seasoning. A single row may be planted as an edging to an onion-bed, and it is easily increased by parting the roots in spring and autumn.

V. SPINACEOUS PLANTS.

Spinach (*Spinacea oleracea*) is an annual plant, a native of Western Asia. It has long been cultivated for the sake of its succulent leaves, which, when properly dressed, form an agreeable and nutritious article of food. There are three varieties: the Smooth-seeded, the Large-leaved or Flanders, having also smooth seeds; and the Prickly-seeded. The latter, as being the most hardy, is often called winter spinach.

The first sowing is made in August, in some sheltered situation; the plants, as they advance, are thinned, and the ground is hoed. In the beginning of winter the outer leaves become fit for use; in mild weather successive gatherings are obtained, and with proper management, the crops may be prolonged to the begining of May.

To afford a succession-crop, the seeds of the round-leaved smooth-seeded varieties should be sown in the end of January, and again in February and March. From this period it is proper to sow small quantities once a-fortnight, summer spinach lasting only a short time. The open spaces between the lines of cauliflower, and others of the cabbage tribe, will generally afford enough of room for these transient crops. They are generally sown in shallow drills, and are thinned out and weeded as may be required.

WHITE BEET.

The white beet (*Beta cicla*) is cultivated for the leaves, which are used as spinach. The midribs and stalks of the great white beet (*poirée grosse blanche*), when separated from the leaves, are sometimes stewed and eaten as asparagus, under the name of Swiss Chard. The culture does not differ materially from that of the red beet.

NEW ZEALAND SPINACH.

New Zealand spinach (*Tetragonia expansa*) is a half-hardy annual, a native of New Zealand, from which it was brought by Sir Joseph Banks. The plants grow tall and spread wide; the leaves form a good substitute for spinach; and if the plants are well watered, they will continue to afford large quantities of succulent leaves during the hottest and driest weather, when summer spinach is useless. The seed is usually sown in a pot placed in a melon-frame in March: the seedlings are transplanted singly into small pots, and kept under cover till the beginning of June, when they are plunged out at two or three feet apart, and treated somewhat like gourds. In gathering the leaves, care should be taken not to injure the leading shoots.

QUINOA SPINACH.

Quinoa spinach (*Chenopodium Quinoa*). This vegetable is a native not only of Chili but of the table-land of Mexico. It is described and figured by Ruiz and Pavon; and Humboldt informs us, that in Mexico the leaves are universally used as spinach or greens, and the seeds in soups, or like rice, so that quinoa there vies in utility with the potato itself. Considering the elevated region in America in which the quinoa is successfully cultivated, there can be no doubt that its herbage can be freely produced in this country. In order to secure the ripening of seeds, however, it is requisite to place some plants close by a wall having a south or south-west aspect, as is practised with seedling onions. There are two varieties, the common white-seeded or green quinoa, and the dark-seeded or red quinoa, the former seemingly the more hardy, or at least germinating most freely.

Garden Orache (*Atriplex hortensis*), Wild Spinach (*Chenopodium Bonus Henricus*), and Garden Patience (*Rumex Patientia*), are sometimes used in place of common spinach; but as, in this country at least, they are deemed rather curious than useful, it may be sufficient to indicate their names.

VI.—ASPARAGINOUS PLANTS.

Asparagus (*Asparagus officinalis*) is a perennial plant, a native of the shores of Britain, where it occurs sparingly, and of the steppes in the east of Europe. Though somewhat unpromising while in a state of nature, it affords, by cultivation, an esculent of considerable value, and is therefore grown extensively both in private and in market gardens. The principal varieties are the *red-topped* and the *green-topped*, of which the latter, while it is less succulent, is considered the better flavoured. There are numerous subvarieties, such as the Battersea, Gravesend, Giant, &c., which differ only slightly from those already mentioned.

Asparagus, growing naturally on loose sand, should have a light deep soil, through which it may be able to shoot its long stringy roots. Two feet and a half is considered a desirable depth, but in France the ground is sometimes prepared, by trenching and sifting, to double that depth. A considerable portion of old dung or of recent sea-weed is laid in the bottom of the trench; and another top-dressing of well-rooted manure should be digged in preparatory to planting or sowing. The older horticulturists used to grow their asparagus in beds four or five feet wide, with intervening alleys of about eighteen inches in breadth. At present, in Scotland, it is customary to sow or plant in rows from three to four feet asunder; a method which, in every way, is found to be most convenient. Except where the garden is new, when, of course, it is advantageous to procure a supply of ready-grown plants, it is thought preferable to keep up the stock of asparagus from seed.

The sowing is made in March, in slight drills ; and, as a portion of the seed often fails to germinate, it is a good precaution to employ about double the quantity of seed that may be ultimately necessary. If the plants come up too thickly, they may be thinned out towards the end of the first summer, to the distance of about six inches in the rows. The ground is hoed, and kept clear of weeds. It is a common practice to take slight crops of onions, lettuce, cauliflower, or turnip, between the lines of asparagus during the first, and, if the rows be wide, also in the second year. The young heads or stalks, the part used, should not be cut before the third spring, and they are not in perfection till the fourth or fifth.

The asparagus quarter can scarcely be over manured. The proper time to perform this operation is in the end of autumn, when the annual flower-stalks are removed, preparatory for winter. When beds are employed, their surface should be stirred with a fork ; a layer of well-rotted hotbed dung is then laid on, and the whole covered with a sprinkling of earth from the alleys. If the plants are grown in rows, the manure is simply dug in by means of a three-pronged fork, care being taken not to injure the roots. This operation is repeated annually, and no other culture is required. It is necessary to observe a due moderation in reaping the crop, as the shoots, when much cut, become progressively smaller, and less valuable. Hence it is a general rule with gardeners never to gather asparagus after peas have come into season. Thus managed, a bed will continue productive for a number of years.

Asparagus readily admits of being *forced.* The most common method is to prepare, early in the year, a moderate hotbed of stable-litter, and to cover it with a common frame. After the heat of fermentation has somewhat subsided, the surface of the bed is lined with turf, to prevent the escape of vapour; a layer of light earth or exhausted tan-bark is put over the turf, and in this the roots of asparagus plants five or six years old are closely placed. The crowns of the roots are then covered with two or three inches of soil. A common three-light frame may hold 500 or 600 plants, and will afford a supply for several weeks. After planting, linings are applied when necessary, and air is occasionally admitted. Care must be taken not to scorch the roots. Where there are pits for the culture of late melons or succession pine-plants, such as the Alderston-pit, or the succession-pit heated with hot-water, they may advantageously be applied to this purpose.

It has sometimes been recommended to force asparagus on the ground on which it grows. Perhaps the best method is that suggested by Mr Spiers, in vol. iv. of the *Gardener's Magazine.* The seed is sown in beds four feet eight inches wide, containing four rows of plants eleven inches asunder in the beds. The beds have side trenches, two feet wide, and two feet deep, lined by pigeon-hole brickwork,—an operation which need not be performed till immediately before forcing, that is, when the plants are at least three years old. In October, when the stalks are cleared away, the surface is covered with littery straw. When forcing is commenced, the brick-lined trenches are filled with hot stable-dung, well beaten, to about eighteen inches above the surface of the ground. The bed is also covered with prepared dung. In about twelve days, when the buds have begun to appear, the latter covering is removed, glazed frames are placed, resting upon the brickwork, a little fine soil is sifted over the plants, the linings in the trenches are raised higher, and the whole treated like a common hotbed. In this way, we are informed, excellent supplies may be obtained, and the plants may be forced every year.

Before leaving this subject, it may be mentioned, that about Bath the young flower-spikes of *Ornithogalum pyrenaicum*, found native in that neighbourhood, are used like asparagus, under the name of *Prussian Grass*.

SEA-KALE.

Sea-Kale (*Crambe maritima*) is a perennial plant, growing spontaneously on the shores of the southern parts of Great Britain. The roots are spreading, the leaves waved, glaucous, and covered with a fine mealy bloom, and the stalk rises to about two feet high, bearing white flowers which smell of honey, followed by seed-pods, each containing a single seed.

The country people in the west of England have long been accustomed to use in spring the young shoots, which, by passing through the sand and gravel on which they grow, are somewhat blanched and rendered tender. In conformity with this practice, the cultivation formerly consisted merely in covering the beds, on the approach of spring, with a little dry earth or sand, in order to blanch the shoots. These were cut as they appeared in March and April. Now, however, the blanching is not only much more completely effected, but simple means have been devised for supplying the table for half the year, including all the winter months. It has now become a vegetable common in the markets both of London and Edinburgh.

Sea-kale seems partial to a light dry soil. If manure be added, it should consist of sea-weed or half-rotted leaves of trees. The plants may be propagated by off-sets, or small pieces of the roots having buds or eyes attached; but the most eligible method is by seed. Very tolerable blanched stalks are sometimes produced by plants only nine months old from the seed; and after two summers, seedling plants will have acquired sufficient strength for general cropping. The sowing is made in March, the seeds being deposited in patches of three or four together: the patches are arranged in lines three feet apart, and two feet in the line. In order to secure a succession, and to obviate the bad effects of forcing, it is proper to sow a few lines of sea-kale every year.

Various modes of blanching the shoots have been resorted to. In the first volume of the *Memoirs of the Caledonian Horticultural Society*, Sir George S. Mackenzie describes a very convenient method. The sea-kale bed is merely covered, early in spring, with clean and dry oat-straw, which is removed as often as it becomes musty. The shoots rise through the straw, and are at the same time pretty well blanched. Others employ dried tree-leaves for this purpose. Another method, practised by many gardeners, consists in placing over each plant an inverted flower-pot of the largest size; but convenient *blanching-pots*, with moveable lids, have been constructed for the express purpose. It may be proper to provide from thirty to sixty such pots; each pot will, on an average, furnish a dish and a half of shoots during the season.

With the aid of these pots, sea-kale is *forced* in the open border in the way now to be described. In the latter end of autumn a bed of vigorous sea-kale plants is dressed—that is, the stalks are cut over, and the decayed leaves removed; the ground, at the same time, being loosened about the eyes, and a thin stratum of gravel or sifted coal-ashes laid on the surface to keep down earth-worms. A pot with a moveable cover is placed over each plant, or each patch of plants. Stable-litter is then closely packed all round the pots, and raised up to about a foot above them; the whole bed thus assuming the form and appearance of a large hot-bed. When fermentation begins, a thermometer should be occasionally introduced into a few of the pots, to ascertain that the temperature within does not exceed 60° Fahrenheit, and the depth of the litter is to be regulated accordingly. The vegetation of the included plants is speedily promoted; so that, in the space of a month or six weeks, the shoots will be ready for cutting, which being thus excluded from the light, are most effectually blanched, and found to be exceedingly tender and crisp. By means of the moveable lids, the plants are examined and the shoots gathered without materially disturbing the litter. By commencing the litter coverings at various times, on different portions of the quarter, a supply of sea-kale for the table can be readily furnished from the middle of November till the middle of May.

THE ARTICHOKE.

The Artichoke (*Cynara Scolymus*) is a perennial plant, a native of the south of Europe, and a well-known inhabitant of our gardens. It resembles a thistle on a large scale. In France, the entire head or whole leaves of the involucre of the artichoke are eaten, when in a young and tender state, *en poivrade*, or with pepper, salt, and vinegar; but in this country, the only parts used are the base of the leaves of the calyx, and the immature receptacle, or phoranthium, commonly called the *bottom*, freed from the bristly seed-down which has been called the *choke*. The varieties are the Conical or French, the Globe or Red artichoke, and the Dwarf globe. Of these the first is the highest flavoured, the second is well adapted for a general crop, and the third is prolific, and occupies little room.

The artichoke requires a deep, cool, dry soil. It is propagated by parting the roots in April, the sets being planted in rows four or five feet asunder, and two feet apart in the rows. The young plants generally afford a crop which succeeds that of old plants; and for this reason a new plantation is made in some gardens every year. During summer the plants are to be kept clear of weeds, but require little other attention. In November the decayed stems and leaves are removed, and the ground cleared. Sometimes the earth is ridged slightly around the roots, in order to defend the stools from the frost. This, however, is done more effectually by a litter of straw, or of the refuse of the stable-yard, of the depth of a foot, drawn close round the base of the leaves. In April this litter is taken away, the stools are examined, and two or three only of the strongest shoots permitted to remain. The offsets, which are carefully removed, afford materials for a young plantation. In the north of France, where a severe winter is apt wholly to destroy the artichoke quarter, it has been found advantageous to take up at the commencement of winter a number of the most vigorous stools with the eyes or buds entire, and to store them in a cellar free from the influence of frost. They are replanted in the spring; and not only do they grow well, but they afford an *earlier* crop than the shoots left in the ground. In the spring the ground between the rows is digged over. At this time manure may be applied; well-rotted hotbed dung, and, above all, seaweed, being considered preferable.

THE CARDOON.

The Cardoon (*Cynara Cardunculus*) is a perennial plant, a native of the south of France and Spain. It has a close resemblance to the artichoke, but surpasses it in size. The edible part or *chard*, as it is called, is composed of the blanched and crisp stalks of the inner leaves. Besides the common sort, there is a kind called the Spanish Cardoon, which many prefer; and also a prickly variety, known by the name of the Cardoon of Tours, and much used on the Continent. The common artichoke is likewise employed occasionally for the production of chard. Cardoons are found to prosper best on light, deep soil. The seed is sown annually about the middle of May, in shallow trenches, like those for celery, and the plants are thinned out to ten or twelve inches from each other in the lines. In dry weather water is copiously supplied, not only to increase the succulence of the leaves, but to prevent the formation of flower-stalks, which render the plant useless. In autumn the leaves are applied close to each other, and wrapped round with bands of hay or straw, the points of the leaves only being left free. Earth is then drawn up around the leaf-stems to the height of fifteen or eighteen inches. Sometimes cardoons are blanched by a more thorough earthing up, in the manner of celery; but in this case the operation must be commenced in summer, and regularly carried on through the autumn. During severe frost the tops of the leaves should be defended with straw or haulm.

THE RAMPION.

The Rampion (*Campanula Rapunculus*) is an English native biennial, the roots of which, under the name of *ramps*, are used raw as a salad, or boiled like asparagus. It is but little cultivated in this country. Where, however, it is desired, the seed is sown broadcast, about the beginning of June, in a cool situation, and the young plants are merely thinned and kept clear of weeds. On the approach of frost, the roots, which somewhat resemble small radishes, are stored in sand, and will keep fresh and firm till spring.

RHUBARB.

Of Rhubarb (*Rheum*) several species and many varieties are cultivated for the purpose of supplying materials for tarts, the footstalks of the leaves being well adapted for that purpose, and coming into use at a most convenient season, when apples are becoming scarce. *R. Rhaponticum* with red stalks, and *palmatum* with green, were the species first employed, and these are still occasionally used; but the sorts now preferred are seminal varieties, mostly allied to *R. hybridum* and *R. undulatum*. The following are worthy of notice:—

Wilmot's.
Gigantic.
Elford.
Buck's.
Culbertson's.
Victoria.

Of these, the editor of the *Horticultural Register* prefers the first two, the former as being excellently suited for forcing, the latter as growing to a large size, without rankness. The stalks of Buck's Early and the Elford are of a bright scarlet colour, which they retain even when forced in the dark; and they are at the same time tender and of delicate flavour. Myatt's Victoria yields stalks of great size. A very useful variety is known at Edinburgh by the name of Culbertson's Rhubarb. It is less apt to shoot into flower than most other sorts; and, although the leaf-stalks are small, they are very numerous. Rhubarb may be multiplied by dividing the roots; and this is the common practice: but they thrive much better when grown from seed. Sir Joseph Paxton recommends sowing on a slight hotbed in spring, and transplanting out in rows in the month of May. Formerly no stalks were gathered from the seedling plants for the first two years; but Myatt's Victoria grows so rapidly as to permit cutting even in the first season. A rich but porous soil suits the plant best. Where liquid manure can be applied to a light soil, the leaves attain a very large size. A portion of the crop is allowed to come on under the general influence of the season; but much also is forced, which may be done in a variety of ways. Some treat rhubarb like sea-kale, covering the roots allowed to remain in the ground with large pots or boxes, and surrounding them with fermenting stable-litter. Others take up the roots in autumn, pot them, and force them in vineries or hotbeds. Perhaps the best method is to procure long narrow boxes of a moderate depth, and to place them, packed full of roots, in a mushroom-house or cellar, where there is considerable temperature. The rhubarb soon throws up its stalks; and these, being partially etiolated, possess a delicacy and flavour superior to those grown in the open air. It is easy, by varying the time of subjecting the boxes to the increased temperature, to keep up a succession of rhubarb stalks, from the period at which kitchen apples become scarce, or begin to lose their flavour, till green gooseberries come into season.

VII. PLANTS USED IN SALADS, &c.

THE LETTUCE.

The Lettuce (*Lactuca sativa*) is a hardy annual, but of what country it is a native is unknown. Some suppose it to be a seminal variety of the native *L. virosa*, a poisonous plant, "which," says Professor Lindley, "would not be more remarkable than the fact, that the indigenous celery is one of our strongest poisons." Beside its well-known uses, it may be mentioned that the late Dr Duncan senior, of Edinburgh, prepared from its milky juice a medicine denominated *Lactucarium*, similar in its action to opium, but capable of being administered in cases where idiosyncratic repugnance rendered that powerful drug inadmissible. There are two principal varieties, the Cos or upright, and the round-headed or Cabbage lettuce. The subvarieties are numerous; we may mention the following:—

Cos.	Cabbage.
Black-seeded.	White.
Bath.	Brown Dutch.
White.	Marseilles.
Crown.	Grand Admirable.

By proper care fresh lettuce may be had throughout the whole year. The first sowing is made in January, in some sheltered situation, or under hand-glasses, or in February on a gentle hotbed. The seedlings are transplanted as soon as the weather will permit. A second sowing may be made in the beginning of March, and another in April. Of all culinary crops lettuce is reckoned the least exhausting, some gardeners, indeed, regarding it as tending to enrich rather than impoverish the soil; it may therefore be raised on the fruit-tree borders. Besides the ordinary compartment, the seedlings may be planted on celery ridges, between rows of slight crops of other vegetables, and, in short, in any odd corner which may occur. To obtain a winter supply, a sowing of some of the more hardy varieties, such as the Black-seeded green, or the Bath Cos, and the Brown Dutch, is made in August or September, and the plants are pricked out in October, along the bottom of walls, or under glazed frames.

ENDIVE.

The Endive (*Cichorium Endivia*) is an annual plant, a native of China, from which it was introduced in

1548. It is the lettuce of winter, the blanched hearts being used for salads and in soups. The varieties most commonly cultivated are the Broad-leaved Batavian, and Small Batavian; the Green Curled-leaved, and the White Curled-leaved. By the French the former are called *Scarioles;* the latter, *Cichorées.* A sowing may be made in the beginning of June, and another in July, the seeds being scattered very thinly, that the plants may not come up in clusters. The seedlings are transplanted into a rich soil, where they are arranged in rows 12 or 15 inches asunder, and at the distance of 10 inches in the row. Sometimes they are planted in drills to facilitate the operation of blanching. The later crop should be placed in a sheltered situation, where it may be able to withstand the winter, which it will do, unless the frost prove very intense. When the plants have reached maturity, the leaves are gathered up, and tied together an inch or two below the tips, and afterwards about the middle of the plant. In two or three weeks they are found sufficiently blanched for use. In winter it is necessary to draw the earth quite up about the leaves. At that season, too, the plants may be inserted in a sloping bank of earth, or blanched in boxes in the mushroom-house or in a cellar.

CHICORY.

Chicory (*Cichorium Intybus*) is an indigenous perennial plant, the cultivation of which, for culinary purposes, may be said to have been introduced into Britain by the refugees during the French revolutionary war. By the French it is much esteemed as a winter salad, and being often asked for by foreign cooks, a small portion should be raised in every large garden establishment. When blanched, it is known by the name of *Barbe du Capucin.* When chicory is cultivated in the garden for winter use, the seed is sown in May or June, commonly in drills, and the plants are thinned out to four inches apart. If the first set of leaves grow very strong, owing to wet weather, they are cut off perhaps in the middle of August, about an inch from the ground, so as to promote the production of new leaves, and check the formation of flower-stems. About the beginning of October the plants are raised from the border; all the large leaves are cut off; the roots are also shortened. They are then planted pretty closely together in boxes filled with rich light mould, and watered when needful. When frost comes on, the boxes are protected by any kind of haulm. As the salad is wanted, they are removed into some place having a moderately-increased temperature, but with little light, such as a mushroom-house or cellar off the kitchen. Each box affords two crops of blanched leaves, and these are reckoned fit for cutting when about six inches long. A neat mode of producing the leaves in any common dark cellar, from whence frost is excluded, is as follows:—The roots are packed among moist sand, in a barrel, in the sides of which numerous round holes have been pierced, each about an inch and a half in diameter. The crowns of the roots are so placed that the shoots may readily push their way through the openings; they are thus kept quite clean, and are delicately blanched; they can be very easily gathered as wanted, and repeated cuttings are afforded during winter and early spring.

There is a Continental variety having larger roots than usual, and known by the name of *Chiccorée à Café*, the tuberous roots of which, sliced, dried, and ground, are employed as a substitute for, and in the adulteration of, coffee.

PARSLEY.

Parsley (*Petroselinum sativum*) is a biennial plant, of well-known use in cookery. It is said to be a native of Sardinia, but it now grows spontaneously in various parts of Britain. The varieties are the Common, the Triple Curled, and the Hamburgh, the last of which is cultivated for the sake of its tuberous roots. The curled-leaved is the most ornamental, and possesses the advantage of being readily distinguished from the poisonous *Æthusa*, which resembles the common parsley. Parsley prefers a light, rich soil. It is sown in drills about the beginning of March, and the seed lies some weeks in the ground before the plants appear. As they grow up, they are thinned out, and defended by branches or other coverings from severe weather in winter. The Hamburgh variety is sown about the same time in a well-trenched soil, in drills a foot apart, and is thinned to about nine inches in the rows. In the beginning of November the roots are taken up and stored in sand.

CELERY.

Celery (*Apium graveolens*) is a native biennial, an inhabitant of the sides of ditches near the sea. In its wild state it is of an acrid nature, and of a coarse, rank flavour; but by cultivation it is improved into one of the most agreeable salads. There are two principal varieties; *celery*, properly so called, with upright stalks and fibrous or slightly tuberous roots; and *celeriac*, with large turnip-shaped roots. Of the former, the principal subvarieties are, the Italian, the Red Solid and the White Solid, of which the two last are the best.

Celery is usually sown at three different times: on a hotbed in the beginning of March, and in the open ground in March, and again in April. The seedlings, when about two inches high, are pricked into rich soil, in which they are allowed to stand till they are four or five inches high. The first crop is defended by frames or hand-glasses, and is planted wide, to admit of being lifted with balls of earth adhering to the roots. Towards the end of May trenches for blanching the celery are prepared. These trenches are three and a half or four feet apart, fifteen inches wide at the bottom, and about a foot below the natural level of the surface. The soil at the bottom of the trench is carefully digged and manured, and a single row of plants is placed in each trench. Sometimes, when a large supply is required, the trenches are made six feet wide, and, after a similar preparation, rows fifteen or eighteen inches apart are planted across the trenches. As the plants advance in growth, earth is laid up about the stalks of the leaves, an operation which is repeated at the end of every ten or fifteen days, care being taken not to choke the plants. As the celery approaches maturity, scarcely anything but the tips of the leaves appear above the ridges, and, when lifted, the stalks are found to be completely blanched. Successional crops should then be planted out. Celery succeeds best in a rich, light soil, having abundance of moisture.

CELERIAC.

Celeriac, or turnip-rooted celery (*Celeri-rave* of the French), is treated at first like the early crop of common celery. In the beginning or middle of June it is planted out in a flat bed, in drills fifteen inches apart. A single earthing afterwards suffices. Its large, round roots are used in soups, and are much relished by some. It is, however, more attended to in France and the Low Countries than in Britain. There is a curly-leaved variety, which seems to possess no advantage but its more ornamental foliage.

MUSTARD AND CRESS.

Garden Cress (*Lepidium sativum*), of which the Normandy curled cress is the best variety, and White Mustard (*Sinapis alba*), are generally associated in their use as salads, and in their culture in the garden. They are annual plants, and are eaten only when very young. In winter they may be raised on a slight hotbed, in spring under hand-glasses, or in drills near a south wall, and in summer, when they should be sown once a-fortnight, in drills, in any cool, shady situation.

MISCELLANEOUS PLANTS USED IN COOKERY.

The following annual plants are occasionally used in cookery, or as salads:—Chervil (*Chærophyllum sativum*); Purslane (*Portulaca oleracea*); Lamb's Lettuce (*Fedia olitoria*); Indian Cress (*Tropæolum majus*); Marigold (*Calendula officinalis*); Borage (*Borago officinalis*).

These may be sown in spring, or in the beginning of summer, in any fresh light soils. In general, a small quantity will suffice.

The Common Sorrel (*Rumex Acetosa*), the French Sorrel (*Rumex scutatus*), and the Horse-radish (*Armoracea rusticana*), are perennials, and are increased by parting their roots. They thrive in any cool, shady situation.

The Capsicum or Chilly (*Capsicum annuum*) ,and the Love-Apple (*Solanum Lycopersicum*), are tender annuals from tropical climates. Both are sown in hot-beds in spring, and, after being transplanted and nursed in separate pots, are planted out, the former in a warm border, and the latter against a wall. In Scotland the Capsicum will scarcely mature its fruit without the aid of glass.

Dill (*Anethum graveolens*), and Angelica (*Angelica Archangelica*), are umbelliferous biennials, which have been for a long period, though not extensively, cultivated in our gardens. They are easily raised from seed. With these may be associated the beautiful native perennial, Fennel (*Fœniculum vulgare*); the buds and leaves of which are used in salads and sauces. It may be propagated either by parting the roots, or by seeds, which should be sown in autumn, soon after they are ripe. Finochio, or Florence Fennel, is an improved variety, with more succulent stems ; but its cultivation seems rather neglected in this country. The seed of Finochio may be sown in the end of March, on a warm border, or better, perhaps, in a frame, in the manner of celery. The young plants may be pricked out into a sheltered quarter, at six inches apart in every direction. When the outer leaves covering the stems are pulled off, the stems have a whitish appearance, giving the aspect of blanching. If the weather prove dry, watering is useful, the object being to render the stems as thick and succulent as possible. In Lombardy, these stems are much used: cut into thin slices, they form a favourite garnish for ragouts of fowl or veal; slightly boiled or stewed, and cut small, a desirable ingredient for giving flavour to gravy soups; and along with grated parmesan cheese, an excellent macaroni.

POT HERBS AND MEDICINAL PLANTS.

In every garden, there is a small department set apart for the culture of Sweet Herbs and Medicinal Plants. We need not here enter into details respecting their uses or culture, but shall merely give classified lists.

Shrubby Plants increased by parting the roots, or by cuttings:—Thyme (*Thymus vulgaris*); Sage (*Salvia officinalis*); Winter Savory (*Satureja montana*); Rosemary (*Rosmarinus officinalis*); Lavender (*Lavandula Spica*); Hyssop (*Hyssopus officinalis*); and Rue (*Ruta graveolens*).

Perennial Herbaceous Plants, increased by parting the roots:—Spearmint (*Mentha viridis*); Peppermint (*M. piperita*); Pennyroyal (*M. Pulegium*); Balm (*Melissa officinalis*); Tarragon (*Artemisia Dracunculus*); Tansy (*Tanacetum vulgrae*); Burnet (*Poterium Sanguisorba*); Costmary (*Balsamita vulgaris*); Chamomile (*Anthemis nobilis*).

Biennial or Annual Plants, increased by sowing the seeds : Clary (*Salvia Sclarea*) ; Coriander (*Coriandrum sativum*) ; Caraway (*Carum Carui*) ; Sweet Marjoram (*Origanum Majorana*) ; Summer Savory (*Satureja hortensis*) ; Sweet Basil (*Ocymum basilicum*) ; and Bush Basil (*O. minimum*). These last, the basils, which are natives of the East, and in much request for their delicate flavour, are raised on hotbeds in spring, and transplanted with balls into some warm situation. In Scotland, they are mostly treated as tender annuals, and are grown, under glazed frames, in flower-pots.

It may here be noticed, that the young green leaves of the laurel (*Prunus Laurocerasus*) may properly enough be employed in garnishing; but they ought never to be used, as they too often are, for giving a nutty flavour, or for *greening* other articles ; hydrocyanic or prussic acid being given out, and very apt to prove injurious, even in small quantities.

THE FLOWER GARDEN.

GENERAL REMARKS.

THE cultivation of flowers, if not the most useful, is at least one of the most pleasing, occupations of the horticulturist, and has generally shared largely in his attention. It is probable, that at first, flowers as objects of curiosity, were confined to a few beds or borders in the garden, as is still the case in many old places; but in the progress of the art, and the diffusion of taste, separate departments were allotted to them under the name of Flower Gardens.

The designing of flower gardens unquestionably belongs to the fine arts, involving in it the exercise of invention, taste, and foresight. Its principles are more vague and evanescent than those of any of the sister arts. The hand of the designer is not here guided by the imitation of Nature, for his work is wholly artificial in its arrangements and appliances; neither does utility come in, as in architecture, to supply a form and framework, which it is the artist's part to adorn. " As flower gardens," says Loudon, the best authority on this topic, " are objects of pleasure, the principle which must serve as a guide in laying them out must be taste. Now, in flower gardens, as in other objects, there are different kinds of tastes; these embodied are called styles or characters; and the great art of the designer is, having fixed on a style, to follow it out unmixed with other styles, or with any deviation which would interfere with the kind of taste or impression which that style is calculated to produce. Style, therefore, is the leading principle in laying out flower gardens, as utility is in laying out the kitchen garden. As objects of fancy and taste the styles of flower gardens are various. The modern style is a collection of irregular groups and masses, placed about the house as a medium, uniting it with the open lawn. The ancient geometric style, in place of irregular groups, employed symmetrical forms; in France, adding statues and fountains: in Holland, cut trees and grassy slopes; and in Italy, stone walls, walled terraces, and flights of steps. In some situations these characteristics of parterres may, with propriety, be added to, or used instead of, the modern sort, especially in flat situations; such as are inclosed by high walls; in towns, or where the principal building or object is in a style of architecture which will not render these appendages incongruous. There are other characters of gardens, such as the Chinese, which are not widely different from the modern; the Indian, which consists chiefly of walks under shade, in squares of grass; the Turkish, which abounds in shady retreats, boudoirs of roses and aromatic herbs; and the Spanish, which is distinguished by trellis-work and fountains; but these gardens are not generally adapted to this climate, though, from contemplating and selecting what is beautiful or suitable in each, a style of decoration for the immediate vicinity of mansions might be composed preferable to anything now in use." It may, however, be remarked, that the Flower Garden, properly so called, has generally been too much governed by the laws of landscape-gardening, and these often ill-understood and misapplied. In the days of "clipped hedges and pleached alleys," the parterres and flower-beds were of a description the most grotesque and intricate imaginable. At a subsequent period, when the natural and the picturesque became the objects of imitation in the park, there appeared the most extravagant attempts at wildness in the garden. The result has been equally unfortunate. It is not meant that where there are merely a few patches of flowers, by way of foreground to the lawn, they should not be subordinated to the principles which regulate the more distant and bolder scenery; but wherever there is a flower-garden of considerable magnitude, and in a separate situation, we think it should be constructed on principles of its own. In such a spot, the great object must be to exhibit to advantage the graceful forms and glorious hues of flowering plants and shrubs; and it is but seldom that mere elegancies in the forms of compartments, and other trickeries of human invention, can bear any comparison with these natural beauties. To express the peculiar nature of garden scenery, as distinct from the picturesque in landscape, Loudon invented the term *gardenesque;* and, whatever may be thought of the term itself, it is very desirable that the distinction should be preserved.

Two varieties of flower gardens have chiefly prevailed in Britain; one, in which the ground is turf, and the pattern, so to speak, is composed of a variety of figures cut out of the turf, and planted with flowers and shrubs; and another, where the flower-beds are separated by gravel walks, without being interspersed with grass at all. The choice of one or other of these varieties ought greatly to depend upon the situation. When the flower garden is to be seen from the windows, or any other elevated point of view, from which the whole or the greater part of the design may be perceived at once, perhaps the former should be preferred. Where the surface is irregular, and the situation more remote, and especially where the beauty of flowers is the chief object of contemplation, the choice should probably fall on the latter. This variety, too, seems preferable, on the principle of contrast, where there are large lawns in the outer grounds, in order that *kept* (or smoothly-mown) grass may not be found everywhere.

Respecting the situation of the flower garden, no very precise directions can be given, as it must be influenced by the size of the domain, the nature of the lawn, and the site of the mansion to which it is attached. Generally speaking, it should not be at any great distance from the house; and in places where there is no distant view of importance, it may be constructed under the windows. In retired scenes, it is delightful to step out of the drawing-room into compartments of flowers, in the vicinity of a greenhouse or conservatory. On the other hand, when the park is spacious, and the prospects extensive and picturesque, it is perhaps better that the flower garden should be at some distance, but not more than a quarter of a mile out of sight of the house, and with an easy access in any sort of weather—an arrangement which would give an agreeable termination to a short walk, a desirable matter in most cases; for it has often been remarked, that many parts of extensive grounds remain unvisited, because they afford no remarkable object to attract attention.

The particular form of a flower garden is equally beyond the inculcation of specific rules. Indeed, it may be of any shape, and, except where the dimensions are extremely limited, the boundaries should not be continuously visible. The taste of the proprietor or designer, and the capabilities of the situation, must determine not only the external configuration, but also the arrangement of the interior parts. By judicious management, it may be made to pass through shrubbery, gradually assuming a more woodland character, and groups of trees, into the park on the one hand, and into the kitchen garden or orchard on the other. In most cases, even where it is in the vicinity of the mansion-house, the flower garden should be encircled with some sort of fence, in order to convey the idea of protection, as well as to furnish security to the vegetable inmates of the parterres, it being impossible to carry on floriculture to any great extent in open places which are accessible to hares and rabbits, or any other kind of intruders. In detached localities, the fences may be made sufficiently strong to preclude the intrusion of every species of vagrant; and these fences it is not difficult to mask with shrubs and trees. A north wall of moderate extent and moderate elevation is often desirable, as affording space for ornamental climbers and half-hardy exotics, and as forming a *point d'appui* for the conservatory and other botanical structures. Such a wall may be surmounted with urns and other achitectural ornaments, and screened at some little distance behind by trees. The other fences may be of wire-work, generally called *invisible*, or of wooden rails, or of holly hedges with rails.

Formerly the flower-beds were made either circular, straight, or in curves, and were turned into knots, scrolls, volutes, and other figures; and this taste prevailed, perhaps, in some measure from a desire on the part of the contrivers to compensate by their ingenuity for the paucity of the ornamental plants which were then cultivated. Now that the riches of Flora have poured into our gardens, a simpler taste has obtained. Of the figures in fashion at present in the lawn flower-garden, perhaps the kidney-shape and its varieties occur too frequently. It is needless, as well as impossible, to specify the numerous configurations of flower plots, for they abound in kaleidoscopical variety. Good taste will suggest that those only should be associated which harmonize well together; and it is better to incur the hazard of an apparent monotony, than to excite wonder by incongruous combinations. When the figures are separated by turf, it is proper that the little lawns or glades should have a considerable degree of breadth, for nothing has a worse effect than overcrowding. A multitude of little figures should also be avoided; for they produce what Mr Gilpin calls *spottiness*, which, as he has correctly pointed out, is a grievous deformity. In this sort of flower garden it is desirable that a gravel-walk should skirt along at least one side of the principal figures; in our humid climate the grass would otherwise render them inaccessible with comfort during a great part of the year. In those gardens from which turf is excluded, the compartments should be of a larger and more massive character.

Narrow borders, bounded by parallel straight lines and concentric curves, should be avoided. The centres of the figures should be occupied with tall-growing shrubs, and even with an occasional low evergreen tree, such as a yew or a holly. The walks, arranged in long concave curves, may communicate here and there with one another. A dial, a few seats and arbours, with an urn or two, or a vase, may be introduced with good effect. It is to be regretted that so few good specimens of this species of flower garden have hitherto been executed in Britain.

Amongst the accompaniments of the flower garden may be mentioned the Rock-work. This consists of variously-grouped masses of large stones, generally such as are remarkable for being figured by water-wearing, or for containing petrifactions or impressions; and into the cavities between the stones, filled with earth, alpine or trailing plants are inserted. These are numerous, and may be endlessly diversified. Several species of Helianthemum, Gentiana, Pentstemon, and Primula; Campanula pumila, blue and white varieties, carpatica, and nitida; Saponaria ocymoides, and Adonis vernalis, Soldanella alpina, Clusii, and minima; Silene acaulis, maritima plena; Sempervivum arachnoideum, grandiflorum, and even the common house-leek or *fouet* of Scotland (*S. tectorum*); Dwarf crimson-flowered Raspberry (*Rubus arcticus*); Dracocephalum grandiflorum; Potentilla tridentata; Phlox subulata, setacea, virginica, and stolonifera; Oxytropis uralensis; Lychnis alpina; Linaria alpina; Liatris pilosa and spicata;

Hippocrepis comosa; Epimedium alpinum; Aubrietia deltoidea; Dryas octopetala and Drummondii; Cardamine bellidifolia; Aster alpinus; Anemone palmata, and Pulsatilla or pasque-flower; Æthionema membranaceum; Aletris farinosa; Iris tenax; Geranium Wallichianum; Gentiana septemfida; Sieversia triflora; Astragalus alpinus; Erinus alpinus and hispanicus; Ramonda pyrenaica; Sedum ternatum; Alyssum olympicum; Antennaria dioica and alpina; Dianthus alpinus and nitidus. No plants produce a finer effect than the different varieties of the common rock-rose (*Helianthemum vulgare*), double-flowered, pale, yellow, and dark orange-coloured.

In appropriate situations, a small piece of water may be introduced, for the culture of aquatic plants.

For such a pond it is sometimes found difficult to form a thoroughly-retentive bottom with clay, however well puddled. In places near the sea, an effective puddle may be obtained by mixing two parts of shore sand with one part of quicklime, and forming a mortar of them with sea-water, to be spread over the bottom of the pond. This mode of puddling was devised by Mr Robert Millie, and adopted with perfect success for a pond at his curious little rock-work garden at Pathhead, in Fife.

One of the walks is sometimes arched over with wire-work, and covered with ornamental climbing shrubs, affording a delightful promenade in the glowing days of summer. A separate compartment, generally of some regular figure, is set apart for roses.

A moist or rather a shady border, with bog earth, is devoted to that class of shrubs, commonly, but not very accurately, designated "American plants." The following list comprises those best suited for such a purpose. Rhododendron caucasicum, ferrugineum, Chamæcistus, lapponicum, hirsutum, campanulatum, maximum, dahuricum, atrovirens, and several beautiful hybrids, such as the alto-clerense and Russellianum; Kalmia latifolia, glauca, angustifolia, and nitida; Erica australis, arborea, mediterranea, ramulosa, scoparia, vagans, and ciliaris; Ledum palustre and latifolium; Vaccinium Myrtillus, (the Bilberry), and V. uliginosum, (the Blaeberry of this country), and several North American species; Menziesia cœrulea, Rhodora canadensis; also numerous Azaleas, particularly the Ghent varieties. The following free-blooming Hardy Heaths (in their order of flowering from January to December), may also find a place in such a situation:—

Erica herbacea.
———— carnea.
—— mediterranea hybernica.
———— intermedia.
———— stricta.
———— nana.
—— arborea.
—— australis.
———— nana.
—— Tetralix, varieties.
Erica Mackayana.
—— ramulosa.
—— ciliaris.
—— stricta.
Calluna vulgaris, white, pink, red, and double.
Erica cinerea, varieties.
—— vagans.
—— multiflora carnea.
———— rubra.

In extensive places, a separate "American Garden" is often formed in a locality which, if not damp, has at least the command of water, occupying generally some warm corner of the park.

Some writers have advocated the formation of Winter and Spring Gardens in separate localities; but we are not aware that their ideas have ever been embodied to any great extent. It is proposed that in the Winter

Garden should be assembled all the hardy evergreen shrubs and plants, together with the few flowers that bloom during the brumal months. The situation, it is recommended, should be well sheltered, and open only to the warm rays of the sun, which are peculiarly grateful in our cold season. Though a Winter Garden (the very name of which is chilling) is perhaps not very desirable by itself, the object sought to be attained should not be lost sight of in the formation of the park and the flower garden. We can easily suppose a particular section of the latter to contain a predominance of evergreens, and to possess the principal characters of a Winter Garden, without the formality of its name and purpose. In the endless variety of situations, it is not difficult to imagine a sloping bank, for instance, facing the sun, with a long walk skirting its base, the lower side of which might be adorned with a border or narrow parterre planted with arbutus and periwinkle, whilst the slope is covered with the higher evergreens, and the summit of the acclivity is crowned with groups of deciduous trees, interrupted by a few straggling firs, through which the wind, unfelt below, might sigh its melancholy music. Again, a site for the Spring Garden, which need not be of very great extent, may be found in the vicinity of the greenhouse or conservatory, with which it is naturally allied.

SOIL.

A variety of soils is required in the Flower Garden, to suit the very different kinds of plants that fall to be cultivated. To florists' flowers particular composts are assigned, and these shall be mentioned when treating of the flowers themselves. *American plants* require a peaty earth, varying from boggy peat to almost pure sand. Alluvial peat, that is, boggy earth which has been washed away and incorporated with white sand, is to be preferred: peat cut from its natural bed and only partially decomposed, is of no value at all, or rather is positively prejudicial to plants. In collecting soil from the surface of a muir, it is proper to take no more than the upper turf or sod, with the peat adhering to it, and only from the driest parts of the muir, where particles of white sand abound, and where, besides the common heath, fescue-grasses occur. Where this kind of muir-soil cannot be procured, a good substitute is found in vegetable mould, that is, decayed leaves swept from lawns or woods, and allowed to lie in heaps for a few years. For the general purposes of the Flower Garden a light loamy soil is advantageous; and, where the natural covering is thin, or requires making up, recourse should be had to the surface-earth of old pastures, which, especially when incumbent on trap-rock, is found to be excellent. It is expedient to have a large mass of this material always in the compost yard. The turf, and the surface-soil adhering to it, should be laid up in a rough state, in which way it is continually ameliorating, by the decomposition of the vegetable matters, and the action of the air.

GARDEN WALKS.

During the prevalence of the Dutch taste, grass walks were common in our gardens; but, in consequence of the inconvenience arising from their frequent wetness in our humid climate, they have in a great measure been discarded. Their disuse is perhaps to be regretted, as in some situations, particularly behind lengthened screens of trees, or in gardens from which grass has been in a great measure excluded, they form rather an agreeable variety. It is justly observed by Sir William Temple, that "two things peculiar to us, and which contribute much to the beauty and elegance of our gardens, are the gravel of our walks, and the fineness and almost perpetual greenness of our turf;" and therefore no trouble should be spared in securing excellence in these respects. In old times, grass walks were formed with much care. After the space which they were to occupy had been digged and levelled that it might subside equably, a thin layer of sand or poor earth was laid upon the surface, and over this a similar layer of good soil. This arrangement was to prevent excessive luxuriance in the grass. In selecting the seed, all annual, wiry, and coarse sorts of grass should be avoided. The proper kinds will be found enumerated at page 8.

Gravel-walks, in this department, are formed precisely in the same manner as those in the kitchen garden. It may, however, be remarked, that numerous gravel-walks, particularly when narrow, have a puny effect. All the principal lines should be broad enough to allow at least three persons to walk abreast: the others may be narrow. Much of the neatness of walks depends upon the material of which they are made. Gravel from an inland pit is to be preferred; though occasionally very excellent varieties are found upon the sea-shore. The gravel of Kensington and Blackheath has attained considerable celebrity; and is frequently employed in remote parts of the kingdom, the expense being lessened by its being conveyed to different seaports as ballast of ships. In summer a gravel-walk requires hoeing and raking from time to time, to clear it from weeds and tufts of grass. After this operation, or even after a simple sweeping, it is rolled down with a hand-roller; and this is repeated as often as the surface is ruffled. Nothing contributes more to the elegance and convenience of garden walks than frequent rolling.

EDGINGS.

Walks are generally separated from the borders and parterres by some kind of dense bushy plant arranged closely in line. By far the best edging is afforded by the Dwarf Dutch Box (*Buxus sempervirens* var.). It is extremely neat, and, when annually clipped, will remain in good order for many years. It may be planted at any season, except when in full growth or in midwinter. Excellent edgings are also formed by Sea Pink (*Statice Armeria*) and Double Daisy (*Bellis perennis*). Dwarf Gentian (*Gentiana acaulis*), London Pride (*Saxifraga umbrosa*), and the pretty native saxifrage (*S. hypnoides*), are likewise used. Indeed, any low-growing herbaceous plant, susceptible of minute division, is fitted for an edging. Among the great variety occasionally employed for this purpose may be mentioned, the Pansy (*Viola tricolor*), the Dwarf Bellflower (*Campanula pumila*), the Cowslip, Polyanthus, Auricula, Hepatica, Veronica fruticulosa, Calluna vulgaris fl. pleno, and

Erica carnea. Edgings may also be formed of spars of wood, narrow pieces of sandstone flag, or even of slight bars of cast-iron. In shrubberies and large flower-plots, verges of grass-turf, about a foot in breadth, make a very handsome border to walks. These should not be allowed to rise high above the gravel; an inch and a half may be assigned as the limit they should not exceed. The grass is kept short by repeated mowings, and the edges are defined by clipping with shears, or cutting with a paring-iron.

SHRUBS.

Much of the beauty of the pleasure-garden depends upon the proper selection and disposition of ornamental trees and shrubs; and it is to be regretted that this department of the art has often been greatly neglected. In many gardens we still find only a few evergreens, and a parcel of rugged deciduous species, introduced probably before the age of Miller. No wonder, therefore, that we sometimes hear complaints of the insipid appearance of the shrubbery. Nevertheless, shrubs are highly elegant in themselves, and they afford a most efficient means of diversifying garden scenery. Of the many beautiful species now to be had in Britain, and affording the materials of exquisite decoration, we can mention only a few.

Of Evergreens, besides the Common Laurel (*Prunus Laurocerasus*) and the Portugal Laurel (*P. lusitanica*), we may notice the American Arborvitæ (*Thuja occidentalis*), as adapted to large masses of shrubs; and the Chinese Arborvitæ (*T. orientalis*), whose size and mode of growth fit it for smaller compartments. The different varieties of Rhamnus Alaternus, and the species of Phillyrea and Juniperus, have long and deservedly been favourite evergreens. The Sweet Bay (*Laurus nobilis*), in favourable situations, rises into a handsome shrub or low tree, and may convey to the student of the classics an idea of the Delphic laurel. The Strawberry Tree (*Arbutus Unedo*), a native of Ireland as well as of the south of Europe, will always find a place as one of the most elegant of plants, equally beautiful as regards foliage, flower, and fruit: nor should its compatriot, the Irish Yew, ascending like the pillared cypress, be forgotten. The Cypress itself, though rather a denizen of the park, may be sparingly introduced. The Laurustinus (*Viburnum Tinus*), with blossoms approaching the snow in whiteness, enlivens the winter season, when little else is in flower in the shrubbery. The Swedish and Irish Junipers deserve a place. Different species of Daphne will not be forgotten. It may be sufficient to enumerate pontica, collina, Cneorum, and hybrida. Several species of Berberis deserve places; in particular, B. Aquifolium, glumacea, dulcis, and repens, which are not only elegant but very hardy. For a long time, the seasons recommended for the planting of evergreens, were either the spring or the autumn; but experience has proved that the *winter* is the safest and most appropriate period of the year. The fragrant Jasmine (*Jasminum officinale*) ought not to be forgotten. It is admirably adapted for covering a wall or a trellis, and, if care be taken not to prune away too many of the young shoots, it will afford its blossoms abundantly. It may also, by cutting in, be trained up as a small standard shrub, or it may be trimmed to a single stem and head, potted, and placed in the greenhouse. As extremely low evergreens, we may mention Gualtheria procumbens and Shallon, Polygala Chamæbuxus, and Astragalus Tragacantha; but these would probably be better placed among what are popularly called American plants. Of the more tender evergreens, we should name the Andrachne (*Arbutus Andrachne*), a beautiful shrub, but liable to be injured by severe frosts; and the Pittosporum Tobira of Japan, with glossy foliage and fragrant flowers. The Broad-leaved Myrtle (*Myrtus romana*), in warm places, and with the aid of a covering in the depth of winter, may be made to clothe the wall with its brilliant verdure for eight months in the year, and with its white flowers for some weeks in the end of summer. Treated in the same way, the noble Magnolia grandiflora (particularly the Exmouth variety) will yield its large and fragrant blossoms. Aucuba japonica and Buxus balearica are handsome shrubs, of a somewhat stronger constitution: the former is very ornamental in dull shady places, where no other shrub will grow, and it withstands severe frost, which destroys Laurustinus. The beautiful tribes of Cistus and Helianthemum, some of which are quite hardy, are well adapted for adorning sloping banks.

Amongst the shrubs that require a peaty soil, or at least a damp and shady situation, the splendid genus Rhododendron holds the principal place. Of the larger species may be mentioned R. ponticum, catawbiense, and maximum, with their numerous hybrid varieties. In early spring R. däuricum and atrovirens expand their blossoms among the first of flowering shrubs. Nor should we overlook punctatum, ferrugineum, and

Chamæcistus, of humbler growth, but not inferior in beauty. With these the closely cognate genus of Azalea, with its multitudinous species and varieties, disputes the palm of elegance. The pale and drooping Andromedas are scarcely of inferior interest. The hardy Heaths (see p. 269), particularly Erica carnea, Tetralix, and stricta, Menziesia polifolia and cærulea, and the Canadian Rhodora, combine to bring up the rear of this department of Flora's train.

The deciduous flowering shrubs are too much neglected in many gardens. They are seldom well managed, either in point of arrangement or of pruning, for the production of picturesque effect. Very often they are huddled together promiscuously, and grow up into the shape of huge sheaves of rushes. With judicious management, there are no finer objects in the vegetable kingdom than the common Lilac (*Syringa vulgaris*), or the hybrid var. (*S. rothomagensis*), or even the old Gueldres-Rose (*Viburnum Opulus*), with "her silver globes, light as the foamy surf." Another species, the Crimped-leaved Gueldres-Rose (*V. plicatum*), produces flowers more abundantly, and is therefore still more ornamental. Nor ought the Mock-orange (*Philadelphus coronarius*) to be neglected; for while the flowers are ornamental, their orange perfume is powerful.

It would lead us into disproportioned detail to specify a tithe of those showy shrubs which should be dear to every floriculturist. Suffice it to name Ribes sanguineum (of which a double-flowered variety and also a white variety have lately appeared), Daphne Mezereum, Spartium of many species, Cytisus, Amygdalus, and

Pyrus. The Ribes speciosum, or Fuchsia-flowered gooseberry, seems to require the protection of a wall, and well deserves it. The fine suffruticose plant Pæonia Moutan requires a sheltered position in the shrubbery, where, in May and June, its flowers excel all others in magnificence. Two species of Garrya, from the higher parts of Mexico, have of late been added to our choice evergreen shrubs: G. elliptica flowers in winter, if the season be open, and succeeds well if trained against a south wall; its male catkins are long, and hang down very gracefully, so that the plant forms a fine accompaniment to the Laurustinus: G. laurifolia is equally hardy, and forms a handsome shrub. From the list published by Loudon, any one might form such a collection as, when properly arranged, would produce all the variety and beauty expected from the shrubbery.

There are many fine climbing shrubs, such as the species of Clematis, particularly grandiflora and Sieboldtii, and of Lonicera or Honeysuckle; the Passiflora cærulea, with its curious and beautiful flowers; and Aristolochia sipho, remarkable for the size and elegance of its foliage. Others, though not precisely of this class, are much beholden to the shelter of a wall, such as the Cercis Siliquastrum or Judas-tree, and Edwardsia tetraptera and microphylla. Among those of recent introduction may be noticed Leycesteria formosa, Glycine sinensis, Eccremocarpus scaber, and Sollya heterophylla. Some herbaceous creepers succeed admirably when trained against a wall in the open garden; particularly Maurandya semperflorens and Barclayana, and Lophospermum scandens and erubescens. The numerous species or varieties of Fuchsia, when planted against the wall, or even in the open ground, and protected with an occasional covering in winter, convey to us a better idea of the riches of Chilian vegetation, than when they are confined to the shelves of the greenhouse. Among the more ornamental hardy varieties may be mentioned F. discolor and F. Riccartonia; and particularly F. corymbiflora, perhaps the finest of all. Many roses are also well adapted for walls, such as the varieties of Noisette, Boursault, and the different species from China.

A separate compartment, called the Rosary, is generally devoted to the cultivation of roses. It is often of an oval form, with concentric beds, and narrow intervening walks of grass or gravel, but it may assume any configuration which is suited to display this favourite plant. Of the thousand varieties of roses which exist in the nurseries we pretend not to give any selection. The reader may, however, refer to the list published by Peter Lawson and Son, the Queen's nurserymen, which is the most complete we know of, and which contains some directions as to the proper culture of each variety. In planting the Rosary, care should be taken to classify the sorts according to the sizes and affinities, otherwise the effect will be much impaired. The sorts are generally classed as Damasks, Perpetuals, French Roses, Chinese Roses, Scotch, Celestials, and Moss Roses. A variety of double-flowering Sweet Briars have been recently added to their number, uniting the beauty of the double rose and the fragrance of the briar. The climbing sorts may be advantageously introduced, being trained to pillar-like trellises. In the Royal Botanic Garden of Edinburgh they are trained to living posts, consisting of straight poplars, closely pollarded, so as to shew only a few leaves at top. The Banksian Rose is one of the finest climbers, but has this peculiarity, that the flowers are produced only on shoots of one year's growth ; the pruning must therefore take place at midsummer, so as to allow time for the development of new shoots; if done in the autumn there can be no roses next season. In Scotland it is suited only for the conservatory. When the Rosary is extensive, it is judicious to intersperse some of the most showy hollyhocks ; for thus the beauty of the quarter is maintained in the later months of autumn, when the roses are chiefly past. Of late years, quantities of standard roses have been imported from the Continent. These are the finer sorts, budded on tall stalks of the wild species, such as R. villosa and canina. They are well adapted to stand singly on the little lawns in flower gardens, or to break the uniformity of low flower borders.

Nearly all shrubs may be propagated by layers, some by budding or grafting, many by separating the roots. In planting out, shrubs may be arranged either singly or in masses ; the latter method is perhaps the most efficient in the production of effect, but it should not be very servilely adhered to, as it is apt to produce monotony. Some kinds should never appear in masses. The white Portugal broom, for instance, when so arranged, gives a limy tint to a garden. Perhaps it is better that groups should contain a predominance of one shrub, set off by a few others of a contrasting figure or colour, than that they should be entirely homogeneous.

HERBACEOUS PLANTS.

Common perennial flowers, whether strictly herbaceous or bulbous, afford the principal materials for floral decoration. Botany supplies, as it were, the colours for the picture, and gardening grinds and prepares them for use. The painting is continually varying, and new shades are arriving and departing in succession. The least consideration of the subject will suggest the rule, that in planting flowers they should be arranged according to their stature, otherwise many of the most beautiful would be lost among their taller compeers. The lowest plants should therefore stand next the margin of the border or parterre, and they should increase in height as they go back. To produce a full show, a profusion, just not amounting to crowding, isrequisite. The flower-plots should present a regular bank of foliage and blossom, rising gradually from the front; but as this might convey an idea of too great precision, a few *staring* plants, on the same principle as those employed in greenhouses, should be thinly scattered over the surface. These may be shrubs, or any tall showy plants, such as Bocconia cordata, Papaver bracteatum, Gladiolus byzantinus, or Lilium candidum.* The management of colour is more difficult. When the long duration of the flowering season is considered, it will be obvious that it is impossible to keep up the show of a single border or plot for six months together, and, consequently, that much of the labour employed in mixing colours is misspent, since plants, as they are commonly arranged, come dropping into flower one after another: and even where a certain number are in bloom at the same time, they necessarily stand apart, and so the effects of contrast, which can be perceived only among adjacent objects, are entirely lost. To obviate this defect, it has been recommended that ornamental plants should be formed into four or five separate suites of flowering, to be distributed over the garden. Not to mention the more vernal flowers, the first might contain the flora of May; the second that of June; the third that of July; and the fourth the tribes of August and the following months. These plants should be kept in separate compartments, arranged either singly or in masses; but the compartments themselves should be so intermingled as that no particular class should be entirely absent from any one quarter of the garden. The May parterres should, however, chiefly occur in the vicinity of the greenhouse or conservatory, or, when these are absent, in a warm sunny situation. The flowerings of June and July, as being highly showy, should occupy the most conspicuous parts of the garden. The autumnal perennials, not being so imposing, may retire into the more secluded situations, as they are sup-

---

* Selections may also be made from the following list of tall-growing perennials: Lilium giganteum, superbum, and chalcedonicum; Asphodelus ramosus, or silver-rod; Phlox pyramidalis; Monarda didyma, Kalmiana, and ciliata; Veronica sibirica and virginica; Campanula pyramidalis; Lychnis chalcedonica fl.pl., or double scarlet lychnis, also single white and double white; Fritillaria imperialis, or Crown imperial; Rudbeckia purpurea; Clematis integrifolia; Chelone barbata, scarlet, and also white, with Chelone mexicana, and C. antwerpensis; Delphi-

---

nium grandiflorum fl. pl., or double larkspur; Aconitum Anthora, lycoctonum, and chinense; Astilbe rivularis; Actæa racemosa; Asclepias incarnata; Aconitum versicolor; Delphinium amethystinum; Silphium perfoliatum and conjunctum.

planted by the superior brilliancy of the annuals, which then fill the vacated beds of florists' flowers, or are scattered over the faded clumps of May and June.

Before attempting to plant, the floriculturist would do well to construct tables or lists of flowers, specifying their respective times of flowering, their colours, and altitudes ; or if he be desirous of saving this trouble, he may procure a small treatise on the subject of flowers, by Peter Lawson and Son of Edinburgh, in which he will find tables of this description very elaborately constructed. These tables, when skilfully used, would prevent mistakes, produce a greater facility of execution, and put the colours nearly as much under control as they are on the painter's pallet. To diversify properly and mingle well together the reds, whites, purples, yellows, and blues, with all their intervening shades, requires considerable taste and powers of conception ; but if success is not attained in the first attempt, inaccuracies should be noted, and rectified at the proper time next season. Certain series of colours have been given, but these it is needless to mention, as it is not very material whether the first flower in a row be red or white. The principal object is to preserve an agreeable contrast ; and as at particular seasons a monotony of tint prevails, it is useful at such times to be in possession of some strong glaring colours. White, for instance, should be much employed in July, to break the duller blues and purples which then preponderate. The orange lily, too, is very effective at that season. On the other hand, yellows are superabundant in autumn, and therefore reds and blues should then be sought for.

Besides mere vividness of colour and elegance of form, there are other qualities which render plants desirable in the flower garden. Whoever has visited a botanic garden must have been sensible of an interest excited by the curious structure of some plants, or by their rarity. Even quaintness of form is deserving of attention; and on this principle the common Welsh onion (*Allium fistulosum*), or the common artichoke (*Cynara Scolymus*), may be allowed to figure in a flower border. At the same time it must be admitted that such expedients should be employed with reserve. No handsome plant should be rejected because it is common, nor any ill-favoured one introduced merely because it is scarce. The flower gardener should have a small nursery frame for the propagation of the finer plants, so as to have at hand a stock, to be transferred into the borders as often as required.

Numerous specimens of such showy plants as Verbena Brillii, atrosanguinea, and Mont Blanc, Phlox Drummondii, with Scarlet Geraniums, Petunias, Salvias, and Fuchsias, may easily be kept over winter, in a greenhouse or vinery, in the very small pots called "thumbs," ready to be plunged in the open borders in May, where they uniformly bloom with much greater vigour and brilliancy than under glass. The following list of plants for this purpose may be useful: Lychnis (Agrostemma) Bungeana, Pelargonium inquinans, cucullatum, and many hybrid varieties of great beauty; Verbena varieties; Alonsoa elegans; Lobelia formosa, propinqua; Nierembergia intermedia; Lantana Selloviana; Gardoquia multiflora; Salvia patens; Malva Croweana; Cineraria, different species; Veronica speciosa; Isotoma axillaris; Anagallis Monelli, grandiflora, cærulea, Phillipsii; Trachelium cæruleum; Lobelia ignea, Milleri, splendens, violacea; Pentstemon Cobæa, Murrayanus; Gardoquia betonicoides; Agathe cœlestis; Ageratum cœlestinum; Calceolaria, Prince Albert and floribunda; Petunia, Prince Alfred-Ernest, Duchess of Kent, and Simpsonii.

We shall here enumerate merely the names of a few of the most ornamental flowers, adapted to the British flower garden.

Vernal Herbaceous Plants.—Helleborus niger, lividus; Eranthus hyemalis; Hepatica triloba var.; Primula vulgaris var., veris, elatior, marginata, helvetica, nivalis, viscosa, integrifolia, cortusoides; Cortusa Mathioli; Soldanella alpina, Clusii; Viola odorata double-flowered, tricolor, biflora, altaica; Dodecatheon Meadia vars.; Orobus vernus; Adonis vernalis; Omphalodes verna; Corydalis lutea, longiflora; Sanguinaria canadensis; Iris pumila; Anemone apennina, Halleri, Pulsatilla; Sisyrinchium grandiflorum; Gentiana verna, acaulis; Saxifraga oppositifolia; Genista Scorpius; Hepatica americana; Dondia Epipactis; Orobus vernus fl. pl.; Arabis grandiflora; Heterotropa asaroides; Nordmannia cordifolia; Aubrietia deltoidea.

Vernal Bulbous and Tuberous Plants.—Galanthus nivalis; Leucojum vernum; Crocus, various species; Cyclamen coum, vernum; Corydalis bulbosa; Erythronium Dens canis; Narcissus Pseudo-Narcissus, moschatus, odorus, Jonquilla, &c.; Fritillaria imperialis, meleagris, persica; Gagea lutea; Tulipa sylvestris; Iris persica; Trillium granditlorum, &c.; Scilla verna, præcox, bifolia, sibirica; Smilacina umbellata; Galanthus plicatus; Sisyrinchium grandiflorum; Leontice altaica; Trichonema Bulbocodium; Erythronium longifolium; Symplocarpus fœtidus, or skunk-flower; Ajax exigua, nana major and minor; Merendera caucasica; Scilla amœna; Saxifraga granulata fl. pl.; Claytonia virginica.

Herbaceous Plants flowering in May.—Anemone narcissiflora, sylvestris, dichotoma; Primula farinosa, scotica; Convallaria majalis; Uvularia grandiflora, perfoliata; Phlox divaricata, subulata, setacea, &c.; Asphodelus luteus, ramosus; Draba aizoides; Viola cornuta, obliqua; Gentiana verna, acaulis; Lupinus polyphyllus; Gaillardia bicolor; Iris florentina, cristata; Tiarella cordifolia; Mitella diphylla; Arenaria verna, and a variety with double flowers; Verbascum Myconi; Asperula odorata, the sweet woodroof of our woods; Houstonia cærulea; Pulmonaria azurea, officinalis; Trollius asiaticus; Symphytum asperrimum; Onosma echioides; Aretia alpina; Androsace maxima; Soldanella montana; Linnæa borealis; Waldsteinia geoides; Aquilegia canadensis and venusta; Dodecatheon Meadia and integrifolia; Epimedium Musschianum and violaceum; Spiræa venusta.—*Bulbs:* Leucojum æstivum, Scilla non-scripta, italica, &c.; Hyacinthus monstrosus; Muscari moschatum, botryoides, comosum; Narcissus Bulbocodium, poeticus, &c.; Ornithogalum umbellatum, pyrenaicum, narbonense, nutans; Leucojum vernum; Narcissus dubius, Tazetta; Puschkinia scilloides; Scilla esculenta, the quamash of the American Indians; S. japonica, campanulata, and peruviana.

June.—Herbaceous Plants: Pæonia officinalis, albiflora, corallina, Humii, &c.; Dianthus, species; Geranium sanguineum, lancastriense, Wallichianum, striatum, &c.; Monarda didyma, Kalmiana; Papaver bracteatum; Saxifraga, species; Spiræa, species; Mimulus Harrisonii, atro-roseus, moschatus; Trollius americanus, europæus; Lysimachia verticillata; Veronica latifolia, &c.; Geum coccineum; Aconitum Napellus, &c.; Potentilla nepalensis; Myosotis alpestris; Anchusa italica; Pentstemon Richardsonii; Actæa spicata; Koniga maritima; Alyssum saxatile; Smilacina stellata; Polemonium cæruleum; Pæonia, different species; Mirabilis jalapa; Dianthus grandiflorus and splendidissimus; Delphinium Guthrianum; Phlox bicolor; Aconitum bicolor; Aconitum ovatum; Potentilla Mayana, atrosanguinea, Hopwoodiana, and Thomasii; Ononis rotundifolia; Lychnis Flos-cuculi fl. albo pl.; Aquilegia glauca, fragrans, and Brownii.—*Bulbous and Tuberous:* Allium Moly; Gladiolus psittacinus, communis; Lilium Pomponium, bulbiferum, aurantiacum, monadelphum, penduliflorum, concolor, &c.; Iris Xiphium, xiphioides, &c.; Czackia Liliastrum; Phalangium Liliago; Ornithogalum nutans; Eremurus spectabilis; Uvularia sessilifolia, lanceolata; Arum triphyllum, Dracunculus, and virginianum; Asphodilus albus and creticus; Convallaria multiflora; Oxalis Bonariensis, alba, and rubra; Scilla pratensis; Funkia Sieboldtii, lanceolata marginata, undulata variegata.

July.—Herbaceous Plants: Phlox intermedia, and many other species of that fine genus; Pentstemon, numerous species; Œnothera, various species; Campanula persicifolia, &c.; Morina longiflora; Delphinium Barlowii; Asclepias amœna, syriaca; Iris fulva, pallida, variegata; Gentiana lutea, asclepiadea, cruciata, septemfida, &c.; Chelone obliqua, barbata, Lyoni; Phlox omniflora, P. Van Houttii, Princess Marion, new striped varieties; Pentstemon gentianoides, and var. coccinea, alba, and new blue; Calceolaria integrifolia, rugosa, rubra, and many pretty hybrids between the Chili species; Verbena, *Whites*, Ada, candidissima, Avalanche, and Queen of Whites; *Scarlets*, Bakerii, Boule de feu, Chandlerii, and Englefieldii; *Purples*, Charlwoodii, Neillii, Emma, and Hudsonii; *Crimsons*, Defiance, Emperor, Louis-Philippe, and Stewartii; *Salmon*, Beauté Suprême, Aurora, Sunbeam, and elegantissima; *Rose*, Coquette, excelsa, modesta, and Queen of England; Lupinus grandifolius; Alstrœmeria aurea; Tradescantia virginica, or blue spiderwort, and also varieties with white and with purple flowers; Antirrhinum caryophilloides, Boule de feu, quadricolor coccineum, Youngii, pictum, superba, and tubiflorum; Petunia, Kentish Beauty, Prince Alfred-Ernest, Rising Sun, Hebe, and Attraction; Anemone vitifolia; Gypsophila altissima; Geum coccineum; Cypella Herbertii; Stachys inodora, speciosa; Lobelia pyramidalis.—*Bulbs:* Lilium Martagon, canadense, tigrinum, superbum, &c.; Tigridia pavonia; Commelina cœlestis; Cyclamen hederæfolium.

Autumnal Herbaceous Plants: Phlox decussata, pyramidalis, tardiflora, bicolor, &c.; Lobelia cardinalis, fulgens, splendens, &c.; Aster sibiricus, Amellus, pulcher, &c.; Solidago, several species; Aconitum japonicum, volubile, variegatum; Gentiana; Saponaria; Lavatera arborea; Eupatorium cannabinum and purpureum; Stevia salicifolia; Saponaria officinalis, with double flowers; Nepeta longiflora; Statice latifolia; Salvia confertiflora; Dahlias of many sorts; Astelbe rivularis; Phlox elegans; Campanula lactiflora; Gladiolus Gandavensis; Achillea Ptarmica, fl. plen.; Aster diffusus, floribundus, foliosus, paniculatus, and spectabilis; Chelone obliqua; Coreopsis verticillata; Helianthus giganteus and microphyllus; Liatris scariosa, spicata, macrostachya, and pycnostachya; Serratula coronata and centaurioides.—*Bulbs:* Colchicum autumnale; Crocus nudiflorus, serotinus; Tritoma pallida, media.

It is with regret that we thus confine ourselves to a dry list of border flowers; but to classify and characterize them, with anything like justice, would require many pages. Within the last few years great accessions of desirable plants have been made of our stores. The Lupines and Pentstemons from Columbia River, the Verbenas and Calceolarias from South America, and the Potentillas and Geraniums from Nepal, have in a great measure changed the face of our flower-gardens. While our riches have multiplied, the difficulty, as well as the necessity, of making a selection have also increased.

Most herbaceous perennial plants are propagated by parting the roots, or by cuttings; but some more conveniently by the sowing of seed.

Biennial Plants.—Plants whose existence is limited to two years, in the latter of which they flower and then decay, are called biennials. Many of them possess considerable beauty; and by their easy propagation and rapid growth, afford a ready means of decorating borders. The following may be considered most worthy of notice: Agrostemma coronaria; Antirrhinum majus; Hedysarum coronarium; Campanula media; Œnothera sinuata biennis; Verbascum formosum; Althæa grandiflora; Scabiosa atro-purpurea; Matthiola simplicicaulis; Digitalis purpurea, var. monstrosa or campanulata, Erysimum Perofskianum; Œnothera Drummondii; Iberis Tenoriana; Linaria tristis; Matthiola incana; Cheiranthus fruticulosus, with double flowers; Lunaria biennis, or moonwort, the large silvery silicles of which are more ornamental than its flowers; Frasera carolinensis; Ammobium alatum; Anchusa italica; Erythrolæna conspicua; French Honeysuckle. When a very desirable *variety* of any plant is procured, such as the striped Antirrhinum majus, or double varieties of Wall-flower, Sweet William, or Mule Pinks, attention should be paid to the striking of cuttings during the summer, as the only sure means of continuance.

Biennials are sown in beds in the end of spring, and are generally transplanted in the course of the autumn into the places where they are intended to stand, that they may be confirmed before winter, and shoot up readily into flower in the following summer.

Annual Plants.—Many of the annual species, though of fugitive duration, are possessed of much beauty of hue and elegance of form. They are further valuable from their pliability, so to speak, and the promptitude with which they may be used. They are besides of easy culture, many requiring nothing more than to have the seeds sown in the spot where they are to grow and flourish. Annuals may be divided into three classes, the *hardy*, the *half-hardy*, and the *tender*. The first class, as stated above, are sown at once in the ground which they are to occupy; the *half-hardy* succeed best when aided at first by a slight hotbed, and then transplanted into the open air; the tender are kept in pots, and treated as greenhouse or stove plants, to which departments they properly belong. It is scarcely necessary to remark that the *hardy* and *half-hardy* sorts may be grown either in patches or in beds, and are subjected to all the rules which regulate the disposition of common border flowers.

Hardy Annuals.

Alyssum calycinum.
Amaranthus caudatus.
hypochondriacus.
Anagallis carnea.
Briza gracilis.
maxima.
Calandrinia discolor.
Calendula officinalis.
Calliopsis bicolor.
Centaurea Cyanus.
Chrysanthemum coronarium fl. pl.
Clarkia elegans.
pulchella.
fl. albo.
Collinsia bartsiæfolia, grandiflora multicolor.
bicolor.
Convolvulus minor atroviolaceus.
tricolor fl. albo.
fl. striato.
Coreopsis Drummondii.
Delphinium Ajacis.
hyacinthiflorum.
Dianthus chinensis.
Eschscholtzia californica alba.
Eschscholtzia crocea.
Eucharidium grandiflorum.
Eutoca viscida.
Gilia capitata fl. albo.
nivalis.
tricolor fl. roseo & albo.
Godetia quadrivulnera.
tenella.
Helichrysum bracteatum.
fl. albo.
Iberis coronaria.
umbellata.
Lavatera trimestris fl. albo.
Leptosiphon androsaceus.
densiflorus.
Limnanthes Douglasi.
grandiflorus.
Lupinus Cruickshanksii.
nanus.
Malope grandiflora.
trifida.
Mentzelia Bartonia.
Nemophila discoidalis.
insignis.
maculata.
Oxalis rosea.
Platystemon californicus.
Reseda odorata.
grandiflora.

- **Saponaria calabrica.**
- **Schizanthus pinnatus.**
- **Senecio elegans.**
- **Silene Armeria.**

Half-Hardy Annuals.

- Browallia elata.
- Calceolaria pinnata.
- Callistemma hortense.
- Chrysanthemum carinatum.
- Clintonia elegans.
  - pulchella.
- Lobelia Erinus.
  - fl. albo.
- Martynia fragrans.
- Matthiola annua.
  - autumnalis.
  - nana.
  - grandiflora.
  - græca.
- Mimulus moschatus.
- Mirabilis Jalapa.
- Nycterinia selaginoides.
  - capensis.
- Petunia nyctaginiflora.
- Phlox Drummondii.
  - oculata.
  - fl. albo.
- Portulaca aurea.
- Rhodanthe Manglesi.
- Scabiosa atropurpurea.
- Schizanthus retusus.
- Tagetes erecta.
  - sulphurea.
  - fistulosa
    - sulphurea.
  - patula.
    - punctata.
    - striata.
    - fl. lutea.
- Zinnia elegans.

Tender Annuals.

- Amaranthus bicolor.
  - tricolor.
- Celosia cristata.
- Cleome pentaphylla.
  - rosea.
- Coix lacryma.
- Desmodium gyrans.
- Gomphrena globosa.
  - fl. rubro.
- Gossypium indicum.
- Hibiscus esculentus.
- Impatiens Balsamina.
  - rosæflora.
  - camelliæflora.
  - nana.
- Lisianthus Russellianus.
- Martynia proboscidea.
- Mimosa pudica.
  - sensitiva.
- Quamoclit vulgaris.
- Solanum Melongena.
  - ovigerum.

We have here enumerated only a selection of species, out of a multitude which is continually receiving accessions. A good many of the sorts mentioned have been introduced during the last twenty years; and we doubt not that, in an equal period from the present, many more will come into notice.

Before leaving this part of the subject, it may be proper to mention, that it is now the practice of some florists to grow and treat as annuals, or rather as biennials, great quantities of the more hardy Pelargonia, Verbenæ, Salviæ, Fuchsiæ, Petuniæ, and other genera. Grown in moderate-sized pots, they are kept in reserve in frames or cold vineries during winter. About the end of May, or as soon as there is no longer any apprehension of injury from frost, the plants are taken out of the pots and plunged into the open ground, in any warm sunny spot or clump in the flower-garden. If the stems be long or naked, they are pegged to the earth. Towards the middle of July they begin to grow vigorously, and in August or September present, in luxuriance at least, a better specimen of their native vegetation than we see elsewhere in our gardens. Upon the approach of frost, they are in general left to their fate, as it is easier to propagate new ones than to preserve the old. These plants, with some of the fine new annuals, and the gorgeous Dahlias, give a splendour to the autumnal flower garden which in former times it did not possess.

FLORISTS' FLOWERS.

This technical appellation has been restricted to certain flowers, which have been especial favourites with florists, and have consequently received a large share of their attention.* Though possessed of great individual beauty, few of them are calculated to make a show at a distance, and the arrangements requisite for their culture do not harmonize well with the general disposition of a flower garden. It is therefore desirable, particularly when considerable refinement is aimed at, that a separate garden, or a separate section of the garden, should be set apart for their culture. The more robust or less valuable varieties, however, which are often as ornamental as the most esteemed, may be introduced into the general parterres. We shall notice the most considerable, in the order in which they naturally attract attention.

The HYACINTH (*Hyacinthus orientalis*), one of the most beautiful and fragrant of the spring flowers, is a native of the Levant, where it occurs abundantly, in form not unlike our common harebell. It has long been a favourite in the East; but has been brought to its present artificial perfection in Holland, chiefly since the beginning of last century, about which time it was also successfully grown in the vicinity of Edinburgh. It must be confessed, however, that, in the culture of this flower, the British florists have never attained to the eminence of the Dutch, principally, however, as is alleged by some, from want of attention and painstaking. According to Miller, the catalogues of the Haarlem florists used to enumerate 200 sorts, some of which sold as high as £200 a bulb; they are now less numerous, and much less expensive.

---

* The finest new varieties of florists' flowers are figured and described in Harrison's Floricultural Cabinet, a cheap monthly periodical. While the letterpress is rather deficient in botanical precision, and the engraving sometimes inferior in style of embellishment, it is certain that much useful information may be gleaned from the work, both as to new varieties and superior modes of culture; and it is but fair to add, that the work has been greatly improved of late years.

Hyacinths are either single, semi-double, or double, and exhibit a great variety of tint. In a fine flower the stalk should be tall, strong, and upright; the blossoms numerous, large, and suspended in a horizontal direction; the whole flower having a compact pyramidal form, with the uppermost blossom quite erect; plain colours should be clear and bright; and strong colours are preferable to pale; when colours are mixed, they should blend with elegance.

The hyacinth delights in a rich light sandy soil; and it is chiefly owing to the want of these qualities in his composts, that the British florist fails in the growth of this beautiful plant. The Dutch compost, as given by the late Hon. and Rev. Mr Herbert, in the *London Hortic. Transactions*, vol. iv., is the following: One-third coarse sea or river sand; one-third rotten cow-dung without litter; and one-third leaf mould. The natural soil is removed to the depth of at least two feet, and the vacant space filled up with compost, previously prepared and well mixed. These materials retain their qualities for six or seven years, but the *Dutch* do not plant hyacinths upon the same place for two years successively. In the alternate years they plant it with narcissus or crocus. We may mention that, in one of the finest beds of hyacinths ever seen in Scotland, a considerable portion of the soil was composed of *sleech*, a sort of sandy and marly deposition from the ooze on the shores of the Forth.

According to Mr Main, St Crispin's day, the 25th of October, is the best to plant the bulbs. They are generally arranged in rows, eight inches asunder, there being four rows in each bed; or, if more convenient, they may be placed in rows across the bed. The bulbs are sunk about three or four inches deep, and it is recommended to put a small quantity of clean sand below and all around each. As the roots are liable to be injured by frost, it is usual to cover the beds with decayed tanners' bark, with litter, or with awnings. The first may be considered the neatest during winter, but an awning is nearly indispensable in spring, when the lingering frost proves exceedingly hurtful to the young flower-stems. The awning may be made of coarse sheeting or duck. As the flower-stems appear, they are tied to little rods to keep them upright and preserve them from accident. In order to perfect the colours, the rays of the sun are admitted in the morning or in the evening, but the glare of mid-day and the cold of night are both excluded. When the season of blossom is over, the awning is removed, or only replaced to keep off heavy rains. Much of the success, in the culture of this flower, depends on the subsequent management of the bulbs. It is the practice in Holland, about a month after the bloom, or when the tips of the leaves assume a withered appearance, to dig up the roots, and, cutting off the stem and the foliage within half an inch of the bulb, but leaving the fibres untouched, to lay the bulbs sideways on the ground, covering them with half an inch of dry earth. After three weeks they are again taken up, cleaned, and removed to the store-room. In this country it is more common to allow them to stand till the leaves be withered, and then to dig them up at once. In the store-room the roots should be kept dry, well aired, and apart from each other.

Where forcing is practised, a few hyacinths may be forced in deep flower-pots filled with light earth, and, when coming into flower, transferred to the greenhouse, which they enliven at the most dead season of the year. In the dwelling-house they are grown in water-glasses made for the purpose; or, with still greater advantage, in boxes filled with damp hypnum-moss.

New varieties of hyacinths are procured by sowing the seed; but this is a tedious process, and seldom followed in this country. The established sorts are propagated by offsets or small bulbs, which form at the base of the parent bulb. Almost all the hyacinths cultivated in this country are imported from Holland, and the quantity of roots annually introduced must be very great.

The TULIP (*Tulipa Gesneriana*) is a native of the East, whence it was introduced into Europe about the middle of the sixteenth century. Gaudy as it is, it has no proper corolla, but only a calyx of six coloured sepals. About the year 1635, the culture of the tulip was very engrossing; and, indeed, the rage for possessing choice sorts had become so great in Holland, as to give rise to a strange species of gambling, known to the collectors of literary and scientific anecdotes by the name of Tulipo-mania, which has tended to bring unmerited discredit on this fine flower. At present, the finer tulips are mostly of moderate price, and though not to be met with in every garden, have yet some zealous cultivators.

There are some varieties, such as the early Duc Van Thol, yellow, white, and red; the Clarimond, the Parrots, and the Double Tulips, which belong, properly speaking, to the general cultivator. The genuine tulip-grower despises these, and will not suffer them to enter his select bed. In this country, the florists' tulips are arranged under four classes. 1. The *Bizarres*, which have a yellow ground, marked with purple or scarlet. 2. The *Byblœmens*, with a white ground, marked with violet or purple. 3. The *Roses*, with a white ground, marked with rose or cherry colour. 4. The *Self* or *Plain-coloured* tulips, which are of one uniform colour, and are chiefly valued as breeders. The byblœmen class includes most of those tulips which are held in high estimation in this country; but the rose or cherry coloured are perhaps the most pleasing.

The properties of a fine late tulip, as specified by Mr Hogg, are the following: "The stem should be strong, erect, thirty inches high; the flower large, of six petals (sepals), which should proceed almost horizontally at first, and turning up, should form an almost perfect cup, with a round bottom, rather widest at top. The three exterior petals should be rather larger than the three interior ones; the limbs of the petals should be rounded, and freed from every species of serrature. The ground colour of the flower at the bottom should be clear white or clear yellow; and the various rich coloured stripes, which are the principal ornament of a fine tulip, should be regular, bold, and distinct at the margin, and terminate in fine broken points, elegantly feathered or pencilled." There are other refinements upon which florists are not quite agreed; and it must be confessed that their standard of excellence is somewhat factitious; for, to an uninstructed eye, though practised in the contemplation of other sorts of beauty, a tulip, which by them is looked upon as worthless, will often appear as fine as the choicest variety in the select bed. Fine tulips are so numerous that it is scarcely possible to name the most desirable. Among the bizarres, the King, Polyphemus, and Everard, are highly prized.

Tulips prosper in a prepared compost of light turfy soil, richly manured with well-rotted cow-dung. Twenty inches depth of soil should be removed, and the vacant space filled up with compost. Some use alternate layers of light soil and cow-dung. The bed should be filled up with compost about the middle of October, and in a fortnight, when the soil has subsided, the bulbs are planted in rows, distant seven or eight inches, and at the depth of about three inches. A little clean sand may be put around the bulbs. After planting, the bed may be covered over with tan, as in the case of hyacinths. In spring it is necessary to shield the leaves and flower-stalks from frost, and also from heavy rains;

and, when in bloom, the flowers should be sheltered from the sun's rays, by which they are speedily injured. A canvas awning, so mounted on a frame that it can be easily withdrawn and replaced, is requisite for every fine collection. The tulip is often regarded as scentless; but this is a mistake; for when concentrated under the awning, the odour is very perceptible. After the sepals have fallen, the seed-vessels are broken off close by the stem, to prevent the plant from exhausting itself in perfecting seed, and to direct its energies to the forming of the new bulb. When the leaves have withered, the bulbs are taken up, dried, and stored, until the planting season comes round.

Tulips are readily propagated by offsets, which are taken off from the parent bulbs, and nursed in separate beds till they are full grown. New varieties may be raised from seed; but they are from five to seven years old before they flower, and, if raised from promiscuous seed, they often turn out worthless. Early in the eighteenth century, the distinguished Scottish cultivator, Justice, was eminently successful in raising fine seedling tulips; and some skilful florists of our own day succeed in breaking their seedlings into colours equal to the choicest byblœmens of Holland. They save the seeds from the first-rate sorts, the stigma of the intended parent flower having been fertilized with the pollen of some other excellent variety. Seedling tulips, it may be remarked, present this anomaly, namely, that, for the first two or three years, they form their new bulbs several inches below the old ones, so that an inexperienced cultivator is sometimes apt to miss them at the time of lifting.

The Ranunculus (*R. asiaticus*) is, like many other of the florists' flowers, a native of the Levant, where it is a favourite of the Turks. It has sported into innumerable varieties, and those now in cultivation in this country are mostly of British origin. The plant is of small stature, furnished with decomposite leaves, and rising from a root formed by a bundle of little tubers.

According to the canons of floral criticism, the properties of a fine double ranunculus are the following :—The stem should be strong, straight, and from eight to ten inches high, supporting a large well-formed blossom at least two inches in diameter, consisting of numerous petals, the largest at the outside, and gradually diminishing in size as they approach the centre of the flower, which should be well filled up with them. The blossom should be of a hemispherical form; its component petals imbricated, neither too closely nor too much separated, and having rather a perpendicular than a horizontal direction. The petals should be broad, and have perfectly entire well-rounded edges; their colours should be dark, clear, rich, or brilliant, either consisting of one colour throughout, or be otherwise variously diversified on an ash, white, sulphur, or fire-coloured ground, or regularly striped, spotted, or mottled in an elegant manner.

The ranunculus requires a stronger and moister soil than most other flowers. Some florists prefer a fresh, strong, rich loam, others recommend a fresh loam, with a considerable portion of rotted cow or horse dung. The Rev. Mr Williamson (*Hort. Trans.*, vol. iv.) uses a stiff clay loam, with a fourth of rotten dung. "The bed should be dug from eighteen inches to two feet deep, and not raised more than four inches above the level of the walks, to preserve the moisture more effectually; at about five inches below the surface should be placed a stratum of two-year-old rotten cow-dung, mixed with earth, six or eight inches thick; but the earth above this stratum, where the roots are to be placed, should be perfectly free from dung, which would prove injurious if nearer. The fibres will draw sufficient nourishment at the depth above mentioned; but if the dung were placed deeper, it would not receive so much advantage from the action of the air." Other florists have recommended the manure to be put at least two feet and a half below the surface of the earth. The principal object, however, is to maintain throughout the bed a genial moisture; and this is to be done by avoiding all hot gravelly earths, and particularly soils that are apt to cake. The tubers are planted late in autumn or early in spring, in rows five or six inches apart, and three or four inches separate in the rows. They should be so close that the foliage shall cover the surface of the bed, for in this way a salutary degree of shade and moisture is preserved. The autumn-planted roots must be sheltered from frost by old tan or hooped mattings. When in flower, the plants are covered with an awning. When the leaves wither, the roots are taken up, dried, and stored.

Scarcely any florists' flower is more readily propagated from seed, or sooner repays the care of the cultivator. The seed is obtained sparingly from semi-double sorts, which are often of themselves very beautiful flowers. It is generally sown in boxes in autumn or spring; but it may also be sown with success in the open ground. The young plants flower, often in the second, and always in the third, year.

The ANEMONE of the flower garden includes two species, *Anemone coronaria*, a native of the Levant, and *A. hortensis*, a native of Italy. These have long shared the attention of the florist, and in his arrangements have generally been associated with the ranunculus, resembling it in its natural affinities and mode of culture. The single and semi-double flowers are considered nearly as fine as the double ones. The sorts are numerous, but at present are seldom distinguished by names. In a fine double anemone the stem should be strong, erect, and not less than nine inches high. The flower should be at least two and a half inches in diameter, consisting of an exterior row of large well-rounded petals, in the form of a broad shallow cup, the interior part of which should contain a number of small petals, mixed with stamens, imbricating each other. The colours should be clear and distinct, when diversified in the same flower, or striking and brilliant, when there is only one tint. Of late years, anemones, remarkable for the magnitude of their flowers and the brilliancy of their hues, have been imported from Holland by Peter Lawson and Son of Edinburgh.

The soil and culture are so nearly the same as in the ranunculus, that it is needless to specify them. The plant continues longer in flower, and the leaves often remain so long green, that it is difficult to find a period of inaction in which to take up the roots. It has been recommended, that, as soon as the bloom is over, the bed should be screened from rain by mattings until the leaves wither. As the tuberous roots are rather brittle, they require considerable care in handling. Anemones are easily raised from the seed. A bed of single anemones, it may be remarked, is a valuable addition to a flower garden, as it affords, in a warm situation, an abundance of handsome and often brilliant spring flowers, almost as early as the snowdrop or the crocus.

When the bloom of the hyacinth, tulip, ranunculus, or anemone, is over, the beds should be filled up with small showy annuals, which will soon restore their gay aspect. These annuals are to be raised on a hotbed, and kept in it, or in patches in a piece of reserve ground, till wanted.

The NARCISSUS is an extensive genus, including a great many interesting species and varieties. It belongs, however, rather to the botanico-florist than to the florist proper; but, as it contains many plants of great elegance, it ought to receive more general attention. The Polyanthus Narcissus (*N. Tazetta*) affords the varieties which are chiefly cultivated by florists, the bulbs of which are yearly imported in quantities from Holland. These prosper in a light soil, containing a little well-rotted dung. The roots should not be stirred more frequently than once in three years; and this remark applies also to Narcissus Jonquilla and odorus, the small and large jonquil, of which fragrant plants there should be beds in every flower-garden. N. Tazetta, like the hyacinth, may also be grown either in pots or in water-glasses.

IRIS.—The species which peculiarly appertain to tne florist are, I. Xiphium and xiphioides, of both of which there are many beautiful varieties. They are of easy culture, succeeding in almost any kind of soil, and requiring to be moved only once in three or four years. The roots are not improved by being kept out of the ground; and perhaps the best method is, upon taking them up and freeing them from their shaggy skins, to replant them immediately.

Besides these may be mentioned the Persian Iris (*I. persica*), a low bulbous-rooted plant, with delicate blue or violet-coloured flowers, and some degree of fragrance. It is extensively cultivated by the Dutch, from whom bulbs are annually procured. It is sometimes grown in water, but oftener in pots of nearly pure sand. When planted out, it requires to be guarded from frosts and heavy rain. The Snake's-head Iris (*I. tuberosa*), is also a fragrant species, and is more hardy than the preceding. Mr Denson, a writer in the *Gard. Mag.*, vol. viii., recommends that it should be allowed to stand two or three years in succession on the same spot; when, " in July, take it up and divide the tubers, planting them, as soon as dug up, six inches deep in a compost formed of half-friable mould, and half-leaf mould, or old hotbed dung, rotted to the consistence of soil. Let the situation be a dry bed or border, at the base of a wall with a southern aspect, and plant the tubers close to the wall, or only a few inches from it." The Chalcedonian Iris (*I. susiana*) is the most magnificent species of the genus, and is well worth the labour of the cultivator. Its stalk, seldom a foot high, is surmounted by a splendid corolla, the petals of which are nearly as broad as the hand, and are of purple or black ground, delicately striped with white. It prefers a loamy soil, and a sunny exposure, and must be guarded from moisture and frosts in winter. For these three species, Loudon recommends the protection of a frame.

There are many other species which are worthy of a place in a select flower garden, and, when well grouped in a peaty earth, form an agreeable appendage to a parterre. Of these we may mention the low creeping I. cristata and pumila, the more aspiring prismatica, flexuosa, virginica, sordida, variegata, and Swertii, the taller sibirica, triflora, and ochroleuca, the broad-leaved florentina, germanica, and sambucina, and the stately pallida, which, for simple elegance, is not outshone by any of its compeers. This beautiful family was zealously cultivated by the late David Falconar, of Carlowrie, who introduced some of its most interesting members to the horticultural world in Scotland.

Lily.—Of the genus Lilium there are many species, some of which have not been exhibited to the extent of their capabilities in the flower garden. The old white Lily (*L. candidum*), after supplying the poets with so much imagery, has retired into the modest station of a common border flower. The flaunting Orange-Lily (*L. bulbiferum*) and the Turk's Cap (*L. Martagon*) may occupy the same place. The scarlet Martagon (*L. chalcedonicum*) is worthy of more care, as being more beautiful and more tender. It does not relish being disturbed, and it dislikes peat. On the contrary, the splendid Tiger Lily (*L. tigrinum*), which propagates rapidly by axillary bulbs, succeeds best in peaty soil. The same remark applies to the rarer L. canadense and superbum (magnificent species), as well as to L. concolor, pennsylvanicum, and others, which ought to be more common in our gardens. L. japonicum, longiflorum, and lancifolium, and their varieties, in which the genus attains its greatest magnificence, unfortunately require a finer climate than ours, and some bulbs of these should, therefore, be grown in pots under glass, but others may be risked in a sheltered border.

GLADIOLUS.—The varieties are extremely ornamental. The Cardinal Lily (*Gladiolus cardinalis*) well deserves the name of superb; when seen in flower in masses, the effect is truly brilliant. In order to insure success, it must be grown in tufts, and the tufts should be left undisturbed for successive years; the old skins of the decayed bulbs permitting the wet to drain away, and preventing the earth from lying close and heavy on the new bulbs. A little litter of any sort thrown over the bed, affords sufficient protection during winter.

The DAHLIA (of which there are two principal species (*D. variabilis* and *coccinea*) is a native of Mexico, from which it was introduced in 1789, but afterwards lost by our cultivators. It was re-introduced in 1804; but it was not till ten years later that it was generally known in our gardens. The first plants were single, of a pale purple colour, and though interesting, as affording a new form of floral ornament, they by no means held forth a promise of the infinite diversity of tint and figure exhibited by their double-flowered successors. At present the varieties are endless, each district of the country possessing suites of its own, and cultivators occasionally raising at one sowing a dozen of kinds which they think worthy of preservation. The results have been most propitious to the flower garden, from which, indeed, the Dahlia could now nearly as ill be spared, as the potato from the kitchen garden.

The varieties of Dahlia may be classed under the following heads: 1. The *Common* or *Camellia* form, under which the double sorts first appeared. This is by far the most numerous class, and perhaps the most beautiful. The dwarf sorts are in most repute. 2. The *Anemone-flowered*, having a radius of large petals, and a central disk of smaller ones, somewhat like the double anemone. 3. *Globe-flowered*, having small globular flowers, which are extremely double. They possess great intensity of colour, and, rising for the most part about the leaves, make generally as striking an appearance as those of a more massive efflorescence.

In a fine Dahlia the flower should be fully double, always filling the centre; the florets should be entire or nearly so, regular in their disposition, each series overlapping the other backwards: they may be either plain or quilled, but never distorted: if, instead of being reflexed, the florets are recurved, the flower will be more symmetrical. The peduncles ought to be strong enough to keep the blossoms erect, and long enough to shew the flowers above the leaves. Bright and deep velvety colours are most admired.

Dahlia competitions now excite great interest in the floricultural world; almost every considerable town having its annual show, when gold and silver medals, cups and other pieces of plate, are keenly contended for; private amateurs and professional cultivators competing respectively among themselves. Fine flowers have become so numerous, that it were a hopeless task to offer a list. Among the most highly prized, at the present day, may only be mentioned Springfield Rival, Dodd's Mary, Neville's Hope, Duchess of Richmond, Essex Rival, Widnall's Conductor, Suffolk Hero, Ruby, Sussex Rival, Marquis of Lothian, Fireball, Cox's Yellow, Ansell's Unique, Grace Darling, Climax, Hylas.

New varieties are, of course, procured from seed; the utmost attention being paid to the parentage and the crossing of flowers of different colours. If sown in flower-pots and aided by a little heat, the seedlings, speedily planted out, will flower the first season. Established varieties are propagated by dividing the large tuberous roots; but, in doing so, care must be taken to have an eye to each portion of tuber, otherwise it will not grow. Sometimes shoots of rare varieties are grafted on the roots of others. A good method, now generally practised, is to take cuttings close from the roots of the plants, as soon as they shoot up in the beginning of summer, and to strike them in small flower-pots. They strike freely, and the plants generally shew flower during the same season.

Dahlias succeed best in an open situation, and in rich loam; but there is scarcely any garden soil in which they will not thrive, if well manured. They are, however, injured by being repeatedly planted on the same spot. They may stand singly like common border flowers, but have the most imposing appearance when seen in masses arranged according to their stature. Old roots often throw up a multitude of stems, which render thinning necessary. As the plants increase in height they should be furnished with strong stakes, by being tied to which they may withstand high winds. Dahlias generally continue to shew their flowers till interrupted by frost in the end of autumn. The roots are then taken up, dried, and stored in a cellar, or some other place where they may be secured from frost and moisture. Early in the spring, the tubers of the finer varieties are placed among leaf-mould on a hotbed, or in boxes in a stove, to *start* them, as the gardeners speak. When thus forwarded, they begin to flower in July, or six weeks earlier than usual; and cuttings taken off from such started tubers in April are sure to form flowering plants in September.

The AURICULA (*Primula Auricula*) is a native of the Alps and the Caucasus. It has long been an inmate of our gardens, and has generally been a favourite with those florists whose means and appliances are of a limited kind. Some of the most successful cultivators at present are among the operatives in the vicinity of Manchester and Paisley.

Besides the double varieties, which have never been in much repute, Auriculas are classed under two divisions: the *Selfs* or plain-coloured, and the *variegated* or *painted* sorts. Professed florists confine their attention to the latter: it must, however, be confessed, that their criteria of fine flowers are often arbitrary, and that, although many of their favourites are examples of undoubted beauty, the eye of the uninitiated would generally prefer the simpler hues of the self-coloured flowers.

The auricula, though now almost wholly an artificial plant, and strangely transformed from its original appearance, still inclines to a moist soil and shady situation. The florists' varieties are grown in rich composts, for the preparation of which numberless receipts have been given. We quote that of an experienced grower:—"One barrow of rich yellow loam, or fresh earth from some meadow, or pasture-land, or common, with the turf well rotted, one barrow-load of leaf-mould, another of cow-dung, two years old at least; and one peck of river, not sea sand. For strong plants intended for exhibition, add to the same composition, as a stimulant, a barrowful of well decayed night-soil, with the application of a little liquid manure before the top-dressing in February, and twice more, but not oftener, in March. A portion of light, sandy, peat-earth may be added, as a safe and useful ingredient, particularly for plants kept in low damp situations."

Auriculas may be propagated from seed. It is to be sown in January or February in boxes, which are kept under cover, and exposed only to the rays of the morning sun. When seed has been saved from the finer sorts, the operation is one of considerable nicety, as it not unfrequently happens that the best seedlings are at first exceedingly weak. The judicious grower never neglects these, but rather nourishes them with double care. They generally flower in the second or third year; and the florist is fortunate who obtains three or four good sorts out of a large sowing. The established varieties are increased by dividing the roots, an operation which is performed in July or in the beginning of August.

Fine auriculas are grown in pots about five or six inches in diameter; the longer or deeper, so much the better. These are kept in frames, or stages constructed for the purpose. For winter, perhaps, there is nothing better than a common hotbed frame, as this admits of an exact adjustment of air and temperature, things to which attention is absolutely necessary, as the plants approach the flowering season in the end of March. After the bloom is over, or in the beginning of June, the pots may be placed on stages slightly elevated, and facing the north. Though not absolutely necessary, it is useful to have the power of sheltering them from long-continued rains. It is usual every year to shift the plants, shortening the roots, and giving them a large portion of new soil, soon after the flowers have decayed.

The POLYANTHUS is supposed to be a seminal variety of Primula vulgaris; and is much cultivated by some florists. Like the auricula it has sported into many hundred varieties. It is not necessary to give a detailed account of its culture, as it scarcely differs from that of the auricula. The polyanthus, however, is the hardier of the two, and seldom perishes from cold. It may be mentioned, that there are several beautiful double varieties of the common Primrose, both white and dark purple, which are deserving of a place in every garden.

The whole genus *Primula* merits the attention of the curious cultivator. P. helvetica and nivalis adorn the flower-borders in spring with their abundant trusses of blossom. P. marginata, when planted in a shady situation, is equally lavish of its pale and delicately beautiful flowers. P. viscosa and integrifolia, with their intense colours, are the ornaments of the alpine frame; or, with P. longifolia, farinosa, and Scotica, may be plunged into the margin of the American border. A supply, however, should be kept in pots. Besides these, we might name P. cortusoides, Pallasii, Palinuri, and others. The curious P. verticillata, and the splendid P. sinensis, are inmates of the greenhouse. Of this last there is a white variety, and also a double-flowered variety. The florist of simple taste will love them all.

The CARNATION (*Dianthus caryophyllus*) has long been a favourite flower, not only for the beauty but for the delightful fragrance of its blossoms. It is a native of Germany, and it is occasionally found in an apparently wild state in England. The cultivation of it, however, is by no means easy, but calls forth all the resources of the florist. The varieties, which are very numerous, have been arranged under three heads: *Flakes*, having two colours, with their stripes running quite through and along the petals; *Bizarres*, irregularly spotted, and striped with not fewer than three colours; *Picotees*, spotted, with serrated or fringed petals. Mr Hogg, who has written a treatise expressly on this flower, has given a catalogue of nearly 350 sorts.

Carnations are propagated by layers or pipings: the former method is most practised, but with some sorts piping, it is said, should be preferred. Layering is performed when the plant is in full bloom. Proper shoots are selected; a few of the lower leaves are then removed; an incision is made a little below a suitable joint, passing up to the joint, but not through it: the shoot is then pegged down and covered with some fresh soil, the tip being left above ground. Layers are generally found to be rooted in about a month after the operation has been performed. Pipings are little cuttings, separated at a joint, and planted thickly under bell-glasses on a slight hotbed. They require great attention, are precarious in their success, but form excellent plants.

Numerous directions have been given respecting composts for carnations. We abridge those of Hogg, who is the principal authority in this matter. Take three barrows of loam, one and a half of garden-mould, two of horse-dung, and one of coarse sand; let these be mixed, and thrown into a heap, and turned over two or three times in the winter, particularly in frosty weather. Towards the end of November a barrow-load of lime is added while hot, to aid in the decomposition of the soil, and destroy worms. For the varieties which are liable to sport, he recommends a poorer compost.

The more robust carnations are planted out in beds or singly in the flower garden; but the finer and more tender sorts are grown in pots of about a foot in diameter. The time of potting is about the end of March. When the flower-stems shew themselves, they are furnished with rods, to which they are tied as they lengthen, to prevent their being broken by the wind or other accident. When the plants begin to expand their blossoms, they are removed to a stage calculated to exhibit their beauties. Some florists place ligatures around the flower-buds, in order to prevent irregular bursting, and even arrange the petals, by removing distortions with fine-pointed scissors.

New varieties are raised from seed. The seed of the hardier double or semi-double sorts often affords a very beautiful bed of flowers, and should not be neglected by those who have the command of extensive flower-gardens.

The Pink is considered by botanists as merely a variety of the carnation. It is, however, very distinct in its character, and constant in its habits. It is one of the mechanics' flowers, and is cultivated most extensively in the neighbourhood of some of the manufacturing towns. Its simple elegance does credit to the taste of those who select it for their favourite; and it deserves a place in the garden of the highest as well as the lowest in the land. Pinks are numerous, the growers at Paisley enumerating about three hundred varieties. Those are preferred which have the limb of the petals nearly entire, and are well marked in the centre with bright crimson or dark purple.

Pinks are mostly propagated by pipings in slight hot-beds or under hand-glasses; and when proper attention is given to the due admission of air, they generally succeed. Occasionally rare sorts, which are scantily furnished with grass, are propagated by layers. This flower does not require such elaborate composts as some others, but it likes fresh light soils, well manured with decayed cow-dung. Not more than two years of blooms should be taken from the same bed, and it is the practice of most florists to have a new bed every year. The flower-stalks are supported by small sticks. As in the carnation, ligatures of bast-matting, or collars of card, are sometimes applied to the calyces of the flowers; but this practice, however it may be followed by those who judge according to the technical "criteria of a fine flower," will scarcely be adopted by any who have an eye for natural beauty.

SWEET VIOLETS, including varieties of Viola odorata and the Neapolitan and Russian violets, are very desirable ornaments in the spring months; and the fragrance of their flowers is delightful when strewed on any kind of server in the boudoir. To have them in perfection, a new plantation should be made every year as soon as they are done flowering, generally towards the middle or end of May, preferring damp or cloudy weather for the operation.

The genus LOBELIA may now be regarded as affording a group of florists' flowers. The leading species are L. cardinalis, fulgens, splendens, and syphilitica; but there are several hybrids of merit. The cardinal flower, of a fine scarlet colour, has long been a valued plant. It is propagated either by seed or by offsets. L. fulgens, of a rich crimson, is a still more showy species, forming a magnificent plant. A Lobelia bed, consisting of these species, and of their hybrid offspring, having perhaps some of the procumbent species on the outside by way of edging, is calculated to produce a beautiful effect in the flower garden, continuing in bloom the whole season. Most of the kinds afford offsets readily; if these be taken off and potted in autumn, in a light sandy soil, they may be kept in a cool frame over winter; or the entire old plants may be put into large pots, and kept in the same way, the offsets being removed in the spring, and forming excellent plants.

It would lead us too much into detail to speak minutely of Calceolaria, Phlox, Chelone, Pentstemon, Œnothera, and other genera, which approach the character of florists' flowers. To have them in perfection, they should be kept in beds by themselves; and we are persuaded that, were a moiety of the care bestowed upon them which is lavished on florists' flowers properly so called, they would amply repay the labour of the cultivator.

The CHRYSANTHEMUM (*Chrysanthemum sinense*), from the peculiar culture which it now undergoes, may be considered to belong to this department of flowers. It is a native of China, and though introduced many years ago, its ornamental capabilities have only recently been brought into notice. Flowering in November and December, it fills up, with its many-coloured blossoms, the blank of a most dreary season, and affords the means of decorating greenhouses, conservatories, and dwelling-houses, when almost all other means of embellishment fail. Forty varieties were enumerated by the late Mr Sabine, in the London Horticultural Memoirs; but several others have since been introduced. The Chrysanthemum is hardy enough to live in the open air, but it requires the shelter of a wall, and from the lateness of its flowering, it is only the early varieties that, even in fine seasons, are enabled to unfold their blossoms against a south wall in our open borders. It is seen in its beauty only when grown in pots and under glass. Yearly plants are preferred. In the beginning of April, cuttings of the last year's shoots, about three inches long, are put singly into small pots, filled with soil composed of one-half bog-earth or leaf-mould, and one-half pure sand. Their growth is expedited at first by gentle heat. In about a month they are found to be rooted, and are placed in a cold frame, in which they are kept till the beginning of June, when they are put into larger pots, and set out in some airy situation. About this time the tops of the plants are pinched off to make them bushy, but no more side shoots are allowed to remain for flowering than the plants are likely to be able to support without a stake. In August they are again shifted into larger pots, filled with strong rich soil. During the whole season, the pots are frequently moved to prevent the roots from striking through, and they are never plunged. Mr Munro of the London Horticultural Society's Garden, whose method of culture we have been describing, recommends liquid manure to be applied from time to time in summer and autumn. Other cultivators, in order to have a greater succession of flowers, and a variety in the stature of the plants, strike cuttings at two seasons, in March and in May, and likewise propagated by layers in August. In the beginning of winter the plants are placed in a cold frame or vinery, and they are brought into a milder temperature as they are wanted. To produce large showy plants, a few of the chrysanthemums of the former year may be selected, and, being freed from suckers, and having the mould shaken from their roots, may be repotted and shifted repeatedly during the summer and autumn.

BOTANICAL STRUCTURES.

Glazed houses for the reception and culture of exotic plants, though sometimes placed in connection with similar structures in the forcing department, are now almost universally regarded as appendages of the flower garden. In the hands of architects they have assumed a great variety of forms, and too often has practical utility been sacrificed to architectural taste. We shall confine ourselves to the exhibition of the principle of the most important of these, and shall limit our remarks to the Greenhouse, Conservatory, and the Stove.

THE GREENHOUSE

Is intended to afford a winter and partly a summer shelter to the less tender classes of exotic plants grown in pots. The annexed woodcut (fig. 48) exhibits the old-fashioned *lean-to* greenhouse. The general form of the house is that of a vinery with pretty lofty front glass. The main part of the area is occupied by a stage

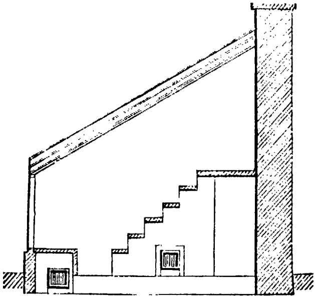


Fig. 48.

rising in steps to receive the potted plants. At some height above the front flue is placed a narrow horizontal bench of trellis-work, to receive pots containing small plants which require to be near the light. Slate has been in many cases advantageously employed in forming the pavement, the shelving, and stages of plant-houses. The interior air is warmed by one or two flues, or other heating apparatus, according to its volume. If a temperature of 45° Fahr. be maintained during winter, it is sufficient. Sometimes greenhouses are constructed with span-roofs and a double stage; but they

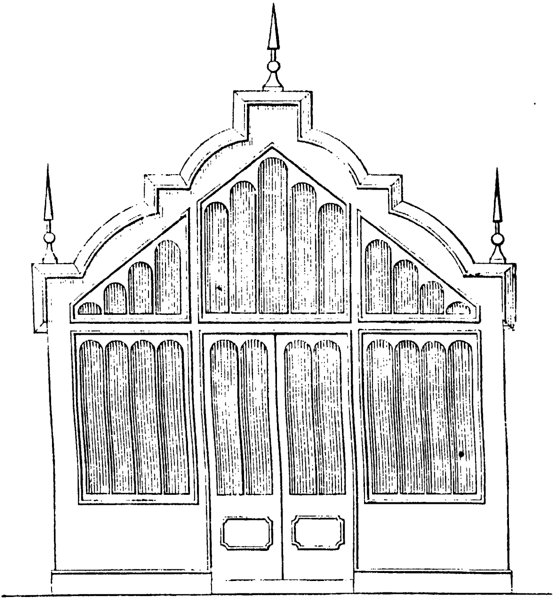


Fig. 49.

out calling for the pecuniary aid of their employers. *To this cause may be ascribed the perpetuation of many mean-looking plants, which, if hardy, would scarcely be tolerated in well-kept shrubberies, and certainly ought not to encumber the greenhouse.*

Light mould produced by the rotting of turf taken from pastures, and mixed with sand, if necessary, or enriched by the addition of leaf-mould, is well adapted for most greenhouse-plants. Some require a mixture of peat earth: others thrive only in pure sandy peat. The common means of propagation is by cuttings, inserted in earth or sand, and covered, if necessary, with bell-glasses. A few sorts are increased by grafting or layering. Nearly all may be raised from the seed, large quantities of which are annually imported from abroad. It may be added, that several greenhouse-plants ripen their seed in this country, but the collecting of such seeds is too often neglected.

Many of these plants require shifting and fresh earth twice a-year; all of them should be repotted once a-year at least. It is the common practice to examine their roots in spring or the early part of summer, and removing the matted fibres, to put them into larger pots if necessary. As room is extremely valuable in limited greenhouses, it is desirable that the plants should be kept of a moderate size; and they are, therefore, rather to be under-potted than otherwise. Many of the free-growing plants require to be shifted again in August; at which period of the year, it is considered preferable to repot those which need to be disturbed only once a-year. During the summer months, a great proportion of the inmates of the greenhouse are placed in the open air, on a spot paved with flagstones, or laid with coal-ashes, to prevent the entrance of earth-worms into the pots, and the spot selected should be well sheltered from high winds. Meanwhile, their place in the greenhouse may be occupied by balsams and other tender annuals of a showy character. On the approach of winter the plants are again placed under cover. All that is necessary in the management of the greenhouse in winter, is to keep up a steady but very moderate temperature, to preclude the evil effects of damp by regular airing in mild dry weather, and to attend to slight watering where it may be needed.

It is worthy of remark, that many species of greenhouse-plants flourish much more luxuriantly, and make a finer appearance when in flower, if planted in the open border during the summer months. Cultivators should therefore diligently propagate such plants by cuttings in pots placed in hotbeds in early spring, so as to have a store for planting out in June.

Of late years, particular genera of plants have come greatly into vogue, and it would be an omission not to notice some of them. Among the foremost may be mentioned the *Pelargonium*, with its affinities. The Pelargoniums are of easy culture, being propagated readily by cuttings, and requiring only to be shifted from time to time. Young plants are very liable to be attacked by the aphidon or green fly. The most effectual cure is tobacco-water (as procured from manufacturers of tobacco, not a mere infusion of tobacco). If the plant is small, it may be dipped into the liquid for a minute or two, not only with impunity, but with great advantage, the insects being thus killed. Equal to these, in point of beauty of colour, and certainly superior in elegance of form, is the family of Cape heaths, or *Ericæ.* Of this genus there are said to be 600 species, considerably more than the half of which exist in our collections. Many heaths may be raised from seed, which occasionally ripens in this country: the most common mode of propagation, however, is by cuttings, and this in some species is attended with difficulty. Very small cuttings are stuck into the purest white sand, and closely covered with bell-glasses. The Ericæ require a peaty and sandy soil, and great attention in watering and giving plenty of air. To have them in perfection, a separate house is indispensable. The heath-house should be very well lighted, easily and thoroughly ventilated, and so planned that the plants may be near the glass; at the same time provision should be made, by means of rollers of thin canvas, to protect the plants from the scorching rays of the summer sun, which are apt to induce mildew. For further information, we may refer to the excellent little treatise of the late Mr M'Nab of the Royal Botanic Garden, Edinburgh, whose success in this department is quite unrivalled, and in whose hands Cape heaths attained a splendour which, we believe, they never reached in the environs of Table Mountain itself. The *Epacridæ* are a lovely tribe from New Holland, which should be cultivated along with the Cape heaths; particularly Epacris impressa, nivalis, variabilis, and campanulata.

The superb genus *Camellia* is the only other that shall here be noticed. To the elegance of the finest evergreen, the Camellia japonica unites the beauty of the fairest rose. The Camellia, though a native of

Japan, is not particularly tender, but, from some peculiarities in its constitution, its culture requires a considerable degree of attention and care. Cuttings of the single red variety strike freely, and upon these, as stocks, the finer sorts are grafted by inarching or side-grafting. The soil generally employed is a mixture of peat and light loam. Care must be taken not to allow the roots to become matted in the pots. The young plants should be shifted at least once a-year: when old, and in large tubs, shifting once in two years will be sufficient. It is found beneficial to apply a certain increased degree of heat while the plants are growing, and till they form flower-buds for the following season. To have Camellias in perfection, a house with a span-roof should be appropriated for their reception.

THE CONSERVATORY.

In the *Conservatory*, the chief plants grow in beds of earth sunk in the floor. Fig. 50 shews the principle of this species of house. The beds marked *b b* are filled with a light soil, calculated for the plants which are to inhabit them. Fig. 51 represents the front elevation

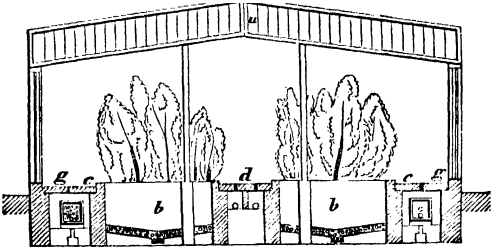


Fig. 50.

Fig. 51.

of the roof, constructed on the ridge and furrow principle. Numerous varieties of this structure also have appeared, and some most sumptuous examples have been erected in the gardens of the opulent. With similar restrictions as in the greenhouse, the conservatory may be said to be capable of assuming any form. Ornamental climbing plants are generally trained under the rafters, with a fine effect; such as Passiflora kermesina, Dolichos lignosus, Ipomœa coccinea, Michauxii, Horsfalliæ, and rubro-cærulea.

Conservatory Plants.—These are composed of a selection from the numerous inmates of the greenhouse. They should be naturally of an elegant form, capable in general of sustaining themselves without the support of stakes, and somewhat hardy in their constitution. Many of the Australian plants, particularly the Acacias and Banksias, are well adapted for this purpose. The ascending Proteas of the Cape, Clethra arborea of Madeira, and many others of a similar habit, may likewise take their place in this department. To these may be added a few of the hardier Heaths and Camellias, together with the broad-leaved Myrtle, double-flowering Pomegranate, Camphor-laurel, Tea-tree, and some of the varieties of the magnificent Rhododendron arboreum. Any wall in the interior of the house may be furnished with a trellis, and covered with such climbing plants as Lonicera japonica, Maurandya semperflorens and Barclayana, and the trailing Pelargoniums. In the management of the conservatory, abundant air should be admitted, and care should be taken not to allow the plants to become *drawn*, or too tall and spindle-formed by overcrowding. They should be so pruned as to keep them comparatively short and bushy; but after all pains have been taken, the time at length arrives, when they either disfigure themselves by pressing against the roof-glass, or must submit to the no less distorting process of a violent amputation. To meet such exigencies, it is recommended that, wherever there is also a greenhouse, a few plants should be kept in training for the conservatory, and substituted in the room of any that, from excess of growth, become unmanageable. After all, the fourth, fifth, and sixth summers of the conservatory will always be the finest; and when a longer series of years have gone by, and the plants have outgrown the space allotted to them, perhaps the best thing that can be done is to change the whole interior of the house, plants, earth, and all. If this operation be anticipated, and for a year or two prepared for, sufficiently large plants may be had in readiness, and the appearance of a well-furnished house be again pretty well attained in a single season. It is scarcely necessary to add, that the neatness which is so desirable everywhere in the flower garden is absolutely indispensable in the conservatory.

THE STOVE.

The *Plant-Stove* may either be a *dry-stove* or a *bark-stove*, or both combined, and is applied to the cultivation of tropical plants which require an elevated temperature. The dry-stove may be considered as a greenhouse, having a larger than usual apparatus for the production of heat. The bark-stove is furnished somewhat in the manner of a pinery, with a receptacle to contain a bed of fermenting tanners' bark, into which the pots are plunged. In this country, stoves are regarded as belonging rather to the botanic than to the flower garden: they are extremely useful, however, in the latter; for, besides presenting the florist with many unusual forms of vegetation, they afford in summer a variety of beautiful plants, which, as they come into bloom, may be introduced into the cooler greenhouse or conservatory, and remain there till the flowering season is over.

Stove-Plants.—There are many beautiful plants, natives of tropical regions, which are cultivated in our stoves, but which, owing to the high temperature they require, can be only occasionally visited with pleasure. This may account for the fact, that ornamental plant-stoves are seldom found but in first-rate gardens, even where the price of fuel is inconsiderable. It is unnecessary to be minute respecting the culture of *dry-stove* plants, it being precisely that of greenhouse plants, differing only in the increased degree of heat. Many dry-stove plants are succulent, such as those belonging to the genera Cactus, Aloe, and Mesembryanthemum. These require rather an arid soil, composed of a little light loam mixed with lime-rubbish or shivers. One of the most successful growers of the cactus tribe was the late Mr Henderson at Woodhall. The compost which he employed consisted of 1 part rotted dung, 1 rotted leaves, 1 heath mould, 1½ loam, and 1 coarse sand, all well mixed together; and the pot was nearly one-third filled with shreds, so as to form an effectual drain.

Some of the species, such as Cactus speciosus, and Cereus flagelliformis, are improved, and made to flower more freely, by being kept growing vigorously in an airy greenhouse during the summer months. The *bark-stove* plants thrive best in a confined moist atmosphere, possessing something of the tepid vapour peculiar to the equatorial climes. In order to furnish bottom-heat, a bark-pit is prepared, into which the pots or tubs are sunk; and the air is heated by flues, by steam, or, what is better, by hot water. Along the front glass, and on the back wall, are shelves, on which pots may be arranged, according as the plants require light or shade. Small cisterns, too, are introduced to contain tender aquatics. Along the rafters some of the more elegant species of Passiflora, such as P. quadrangularis, may be trained; and through the branches of some of the woody plants, Cuscuta chilensis, Tropæolum tricolorum and Jarrattii, and other tender climbers may be allowed to twine themselves. In the pit may be plunged some of the Palms, those princes of plants, particularly the Chinese Plantain, Musa Cavendishii, which is of comparatively humble growth, and often yields its fruit when not exceeding six feet in height.

On the front shelves are occasionally placed shallow troughs filled with sphagnum, and fragments of peat-moss, or decayed wood, for the reception of orchideous plants and other epiphytes.

TROPICAL ORCHIDACEÆ.

Till within the last few years, the cultivation of orchidaceous plants was deemed too difficult to be attempted in private establishments, and was resigned to

Royal Gardens. A great revolution in this respect has since taken place; epiphytes being now extensively cultivated. The collection of such plants in the principal nursery-gardens is vast. Some amateur cultivators eminently excel in them; such as the Duke of Devonshire at Chatsworth, where Sir Joseph Paxton presides; the Duke of Buccleuch at Dalkeith, under the direction of Mr M'Intosh, the well-known horticultural writer; Earl Fitzwilliam at Wentworth, and others. More than 1000 species of epiphytes are now in cultivation. They are all tropical productions, and, of course, need stove-heat in this country; but those from the East Indies require a higher temperature and more humid atmosphere than those from South America. In Scotland, the cultivation of tropical epiphytes is carried to great perfection at the Botanic Gardens of Edinburgh, under Mr James M'Nab, and also at the Experimental Garden of the Caledonian Horticultural Society, under Mr W. W. Evans; and the practices followed in these establishments are here recommended. It has now been fully ascertained, by extensive experience, that their cultivation is not nearly so difficult as was formerly supposed. When pots or shallow pans are used, they should be well furnished at bottom with shivers, or broken bricks or tiles, to drain off superfluous moisture, and then filled up with oblong pieces of spongy peat, between two and three inches in length, and more than an inch in breadth and depth. Chips of rotten sticks, and tufts of decayed hypnum or sphagnum, and the mixture of fibrous roots, which may be grubbed up in any wood having a light or sandy soil, may often be used with advantage, for the growth of Dendrobiums; and, for all, wicker baskets suspended by wires from the rafters, where peat would be apt to get too dry and hard. Some kinds are the better for being fostered with the bottom-heat of a tan-bed. The roots are generally thrown out near the surface: a principal point in the culture consists in encouraging the development of these; the compost of peat and other substances should, therefore, be raised several inches above the margin of the pot, so that the superficial roots may have free scope. It is not necessary that the peat used should be dried; in general it is found to answer best when it is rather soft and spongy. When the peat is dry, it is difficult to get wooden pegs to penetrate without breaking the peat, particularly for Stanhopeas, or plants requiring to be piled high up. The plants may be piled on the peat from 6 to 18 inches, according to the size of the plant, and of the pot used. Stanhopeas are found to flower best when planted on rough peat, a considerable height above the edge of the pots or flats used, so as to allow the flowers to come out from the crevices of the peat. They are also cultivated successfully in baskets of copper wire, made with the work very open, and filled with sphagnum moss. The former method is particularly adapted for a warm, dry atmosphere; and the latter for a warm, moist atmosphere. In wire baskets, likewise, amongst rough peat, the various species of Epiphyllum, with Drymonia punctata and Brugmansia floribunda, may be successfully cultivated.

The following epiphytes are easily cultivated in a vinery or a pine-pit, in pots filled with pieces of peat: Catasetum tridentatum, floribundum; Brassia maculata; Oncidium flexuosum, pulvinatum; Gongora atro-purpurea; Cattleya intermedia, Forbesii, labiata, crispa; Zygopetalon Mackayi; Stanhopea insignis, grandiflora, oculata, tigrina, Devoniana; Crytopodium Andersonii; Acropera Loddigesii. The following kinds are well adapted for being placed in pots filled with hypnum or sphagnum, and suspended from the rafters: Dendrobium Pierardi, cucullatum, speciosum; Oncidium bifolium, papileo, junceum; Fernandesia elegans; Aëranthes grandiflora; Vanda teres, multiflora; Broughtonia sanguinea; Rodriguezia secunda. Some of the larger species grow best in rough, black peat-soil, and flower freely under ordinary treatment in a stove; such as Phajus maculatus; Calanthe veratrifolia; Bletia maculata; Peristeria elata; Cymbidium sinense, aloëfolium, ensifolium; Cypripedium insigne and venustum. The Vanilla plantifolia may be cultivated in the same way; and it has been found that if the retinaculum be carefully removed from the top of the stigma, and the anther turned down to the stigma, the very fragrant fruit of this plant may be produced in our stoves.

A principal object should be to imitate, in some measure, the native climate of these orchidaceæ; to give them a dry or hot season, a rainy or watering period, and a cold or winter season. Generally speaking, the dry season may include May, June, and July; the watering period, August, September, and October; and the cold season, the rest of the year.

The propagation of these epiphytes is not in general difficult. Many sorts form pseudo-bulbs, by means of which they are readily multiplied. In others, if the rhizoma or root-stock be divided, with a piece of stem adhering, there is little risk of failure. These plants come into flower at all seasons of the year. The blossoms of many are beautiful, and of the most curious structure, and some are fragrant.

Before closing, we may remark, that the various botanical structures just described may be efficiently grouped into one imposing assemblage, as that exhibited in the following page, Fig. 52; *a* being a palm-house; *b* for New Holland plants; *c* large greenhouse; and the intermediate spaces being occupied by dry-stove, heath-house, and greenhouses. This mode is, of course, suited only for places of the first order, where splendour is an object, where everything is on a great scale, and expense little regarded. In a vast proportion of cases economy must be studied; and in villa gardens the ornamental plant-house is very often attached to the library or the drawing-room, or has a covered communication from these apartments. A good plan for such a glazed house may be found in the Gardener's Magazine, vol. vi., p. 664.

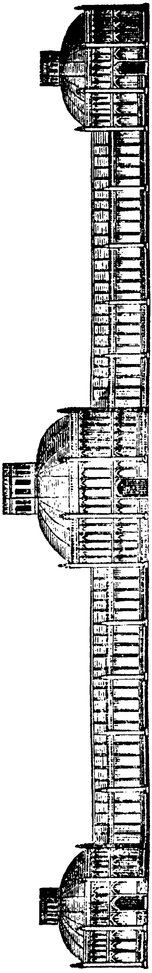


Fig. 52.— Elevation.

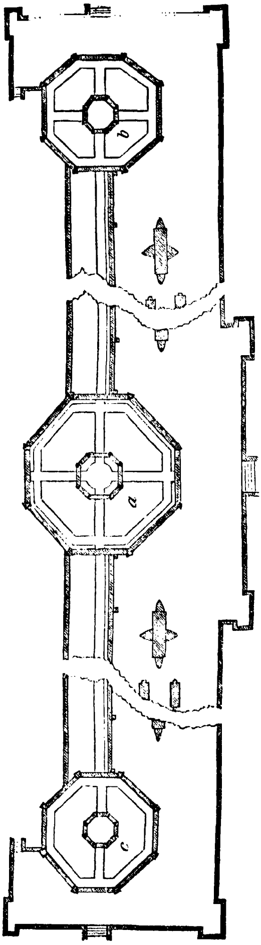


Fig. 52.—Ground Plan.

KALENDAR OF GARDENING OPERATIONS.

JANUARY.

Kitchen-Garden.—Trench and manure borders for early crops. Sow early frame peas, preferring the white Warwick variety and early Charlton in the beginning of the month, and Knight's dwarf marrowfat about the end of the month; Marshall's early dwarf, early mazagan, and longpod beans, during the first and last weeks; a few onions, early horn carrots and round-leaved spinach for early crops, on very light soils; as also curled parsley, if not done in August, on a warm border; short-topped radish in two or three sowings, at a week's interval, in the same situation. In the last fortnight sow hardy green and brown Dutch lettuce.

Plant fruit-trees in general, in open weather, mulching the trees to protect them from the drought which may occur in spring. Plant shallot and garlic.

Prune all sorts of fruit-trees in mild weather or in moderate frosts, nailing only in fine weather; wash those trees infested with insects, with a mixture of soap-suds, flowers of sulphur, and tobacco liquor.*

---

* We have not deemed it necessary to treat separately, or at length, of the means of destroying insects; many of the nostrums

Forcing Department.—About the end of the month, prepare for making up hotbeds for early cucumbers and melons, at least where a pit heated with hot water is not in use. Sow salads, carrots, and kidney-beans on slight hotbeds. Sow peas in cold frames for transplanting. Force asparagus, sea-kale, and rhubarb, in hotbeds in pits, in the mushroom-house, or in the open garden by covers surrounded with litter. Give air in fine weather, and water sparingly, to the pinery and cucumber pit; and to other forcing houses, according to the progress of the trees. Attend to forced kidney-beans and strawberries. Give abundance of air to the greenhouse, conservatory, and alpine frame, but little water. Continue to force roses, kalmias, rhododendrons, and hardy flowers and bulbs, for the decoration of the greenhouse, or to be taken into the lobby or the drawing-room. Most of these ought to be potted and prepared in autumn.

Flower Garden.—Plant dried tubers and bulbs of border flowers, if not done in autumn; but the plant-

---

recommended proving very inefficient. The wash here mentioned is perhaps the best and simplest for the stems and branches of wall fruit-trees. Some prefer making it of the consistence of paint and laying it on with a brush. One advice we would tender to all gardeners,—not to be anxious to kill the smaller kinds of the feathered songsters, the soft-billed warblers of the garden, which are often suspected of attacking blossom or fruit, when they are only picking off caterpillars or aphides, their favourite food. Even the common sparrow and the blue titmouse are useful in destroying the larvæ of the moths which infest fruit-trees. In hothouses, the keeping of the walls and framework clean, by frequent whitewashing and painting, is very important; and much benefit results from occasionally filling them with the smoke of tobacco-paper, and then thoroughly syringing the plants.

ing of the roots of the finer florists' flowers ought to be deferred till next month.

Transplant herbaceous plants and evergreen shrubs in light soils, if not done in autumn ; also deciduous trees, shrubs, and hedges. Lay edgings in fine weather.

Sow mignonette, stocks, and other annuals, in pots ; sow sweet peas, and a few hardy annuals, on a warm border. Give stage auriculas and carnations abundance of air; but keep them rather dry, to prevent damping off.

FEBRUARY.

Kitchen Garden.—Continue to trench and manure the quarters for early crops. Sow beans and peas in the beginning and also at the end of the month ; a few early cabbages, to replace the last sowing in August ; red cabbages and savoys in the last week. Sow also early horn carrot ; Dutch turnip ; onions for a full crop in light soils, with a few Scotch leeks. Sow chervil, fennel, and lettuce for succession, with radishes and round-leaved spinach, twice in the course of the month ; small salads every fortnight.

Plant Jerusalem artichokes, garlic, horse-radish, and early potatoes ; in the last week, a full crop of early cabbages on light soil. All sorts of fruit-trees may still be planted; strawberries about the end of the month. Transplant for seed, if not done before, all the brassica tribe, including cabbage, cauliflower, turnip, &c. ; also carrots, onions, beet, celery, endive, leeks, and parsnips. Transplant to the bottom of the southaspected wall a few of the peas sown in November for the first crop.

Prune apricots, peaches, nectarines, and plums, before the buds be much swelled; also apples, pears, cherries, gooseberries, currants, and raspberries, before the end of the month. Finish the dressing of vines. Keep the fruit-room free from spoiled fruit, and now shut it close, admitting as little air as possible.

Forcing Department.—Plant out melons and cucumbers on hotbeds and in pits, sowing more for succession. Sow carrots, turnips, and early celery; cauliflower to be afterwards planted out. Sow New Zealand spinach in pots. Plant early potatoes on slight hotbeds. Continue the forcing of asparagus, rhubarb, and sea-kale. Pine-apple plants require little air or water at this season, except young plants in dung-frames, which ought to be kept free from damp: shift fruiting plants by the middle of the month, if not done in August. Continue the forcing of all sorts of fruits. Those who have not commenced sooner, and who have a small establishment, will find the middle or end of this month a good season to begin the forcing of vines or peaches. Be careful to protect the stems of vines that are outside of the forcing-houses.

Let the greenhouse and conservatory have plenty of air in mild weather. Put in an extra quantity, if not done in autumn, of cuttings of desirable half-hardy greenhouse genera for the flower garden; such as Pelargonium, Fuchsia, Salpiglossis, Calceolaria, Heliotropium, Salvia, Verbena, Petunia, Alonsoa, Mimulus, Lobelia, Maurandya, Tropæolum, Bouvardia, Rodochiton, Leptospermum, Anagallis. Many species and varieties of such genera are of great beauty, and contribute most essentially to the rich appearance of the flower garden during the summer and autumn months. Sow stocks, a few tender annuals and dahlia seed, on a slight hotbed or in pots.

Flower Garden.—In good weather, plant dried roots, including most of the finer florists' flowers; continue the transplanting of hardy biennial flowers, and perennial herbaceous plants, shrubs, and deciduous trees.

Sow in the last week mignonette, and several species of hardy annuals, in a warm border for subsequent transplanting,—particularly Clarkia, Collinsia, Collomia, Eutoca, Gilia, Limnanthes, Nemophila, Œnothera.

MARCH.

Kitchen Garden.—This is a busy month. Main crops of peas, beans, cabbages, and onions, leeks, carrots, parsnips, Brussels sprouts, borecoles, lettuces, and spinach, are now to be sown. Where space is rather limited, some of the crops, especially peas and beans, may occupy drills four or five feet asunder, so as to permit the interlining of savoys or broccoli, during summer. In the beginning, and also in the end of the month, sow turnips and savoys. In the last fortnight, sow asparagus, cauliflower, sea-kale, couve tronchunda, cardoons, celery, and most of the culinary aromatics, as dill, fennel, parsley. Small salads, such as cresses and mustard, should be sown every ten days, and a row of chervil at the end of the month.

Plant early potatoes in the first week, and a main crop during the last fortnight. Strawberries, Jerusalem artichoke, sea-kale, asparagus, and peas raised in frames, may now be planted out. Full crops of cabbages should also be planted out, and cauliflowers under hand-glasses. Propagate by slips the various pot-herbs, as mint, sage, savory, tansy, tarragon, sorrel. Fork over the asparagus bed, avoiding the buds as much as possible. Transfer New Zealand spinach seedlings into single pots.

Fruit Garden.—Finish the planting and pruning of fruit-trees before the middle of the month. Protect those coming into blossom with the various coverings usually employed, or by giving a little heat to flued walls. Begin grafting in the third week; dig and dress between the rows of gooseberries, currants, and other fruit trees, if not already done. Kill wasps when they first appear, for the death of every individual at this period is equal to the destruction of a colony in autumn.

Forcing Garden.—Proceed with the forcing of melons and cucumbers, giving air, and applying linings to maintain the proper temperature. Examine pine-apple suckers and crowns, potting those that have been kept in tan during the winter; repotting those that require larger pots, and dressing the roots of such as are sickly, about the middle of the month, shift to the succession-pit, and give a top-dressing to the fruiting plants: turn the tan, and add new bark to the pits, to keep up bottom-heat. In the vinery and peach-house, attend to the keeping down of insects by watering; and promote the growth of the young shoots by steaming in the evenings. Graft vines when the shoots are sprung about fifteen inches. Sow seeds of capsicum and tomato; also tender annuals for the stove. Sow salads, early horn carrot, and early Dutch turnip on slight hotbeds during the first fortnight; as also celery and cauliflower for transplanting. Force strawberries and kidney-beans; and continue the forcing of roses, rhododendrons, kalmias, hardy flowers, and bulbs.

Greenhouse.—More water may be given than formerly. Sow seeds of greenhouse and hothouse plants; also the different sorts of tender annuals; pot off those sown last month. Shift greenhouse and stove plants; plant tuberoses in pots for forcing; remove the forced shrubs and plants, as they come into flower, from the forcing-houses to the conservatory and greenhouse; attend to the alpine and auricula frames. Begin to propagate greenhouse and stove plants by cuttings.

Flower Garden and Shrubbery.—In the last week, sow hardy annuals in the borders, with biennials that flower the first season; as also perennials. Plant anemone and ranunculus roots. Transplant from the nursery to their final sites annuals sown in autumn, with biennials and perennial herbaceous plants. Propagate perennials from root-slips and offsets. Protect tulips, hyacinths, and choice flowers, from severe weather. In the last week, put into heat the finer sorts of dahlias, so as to start them, and prepare them for propagation by cuttings and by division of the roots. In the first week, complete the planting of hardy deciduous trees and shrubs; and finish the planting of evergreens by the middle; but some of the hardier sorts may still be planted towards the end of the month. Likewise finish the pruning of all deciduous trees and hedges as soon as possible. Attend to the dressing of shrubberies, laying of turf-edgings, and to the state of gravel-walks.

APRIL.

Kitchen Garden.—Sow main crops of asparagus, sea-kale, beet, salsify, scorzonera, skirret, carrots, and onions, on heavy soils; also peas, beans, turnips, spinach, celery, cabbages, savoys, and German greens, for succession. Sow broccoli and kidney-beans both in the second and in the last week; cardoons not before the end of the month. Small salads should be sown twice or thrice during the month; also sweet herbs, if not sown last month.

Plant cauliflower, cabbages, artichokes, sea-kale, lettuce; and finish the planting of the main crops of potatoes; and also of strawberries. Propagate all sorts of pot-herbs, and sweet herbs, such as lavender, marjoram, hyssop, balm, and pennyroyal. Attend to the hoeing and thinning of spinach, onions, turnips, and carrots. Earth up cabbages, cauliflower, peas, beans, and early potatoes. Stake up peas; blanch sea-kale and rhubarb in the open air, by covering with straw or leaves, or with boxes or earthenware covers. If some roots of scarlet-runners and of Indian cress have been preserved over winter in dry sand, free from frost, they may now be planted out, and will afford an early show of flowers and crop of fruit.

Fruit-Trees.—No pruning or planting ought to be left unfinished till this period; stone-fruits, in particular, are much injured by spring pruning. If vines have been neglected, rubbing off the buds that are not wanted is now safer than pruning. Protect blossoms of the finer sorts of fruit-trees on the walls.

Forcing.—Continue the preparation of succession beds and pits for cucumbers and melons. Attend particularly to the cultivation of those in operation. Sow gourds and basil. Pot love-apples and capsicums. Attend to the routine culture of the pinery, giving water and air when necessary; keeping up the bottom-heat with linings and additions of new tan. In forcing-houses, from the variable state of the weather, considerable vigilance is required in giving air. Keep down red spider (*acarus*) in the more advanced houses, by frequent syringings. Continue the usual operations of disbudding and thinning of fruit, and take care to keep up the proper temperature. As the weather may now be expected to be mild, those who have only a single vinery, melon, or cucumber frame, will find the beginning or middle of this month a proper season to commence forcing with the best chance of success.

Greenhouse, &c.—Little artificial heat will be required except in frosty weather. An abundant supply of air and moisture is now necessary. The glass should be kept off the alpine frames, except in frosty nights. Attend to the protection of stage auriculas from frost, as the flower-buds are easily injured. Sow all sorts of tender annuals. Proceed with all necessary shiftings in the greenhouse and stove. Remove camellias, when the flowers are over, to the stove or forcing-houses, as they require heat to make them form healthy shoots and flower-buds for next season. Propagate chrysanthemums by dividing the roots, and all sorts of rare and fine plants, by cuttings or by grafting. Pot off tender annuals and cuttings of half-hardy greenhouse plants, which were put in to strike in the autumn or in February, for the use of the flower-borders.

Flower Garden and Shrubbery.—Sow main or succession crops of annuals of all sorts; half-hardy annuals in warm borders, or on slight hotbeds. Biennials and perennials should be sown before the middle of the month. Plant Tigridia pavonia and fine stocks. Finish the transplanting of herbaceous perennials by the end of the first week. Protect stage auriculas and hyacinths from extremes of every description of weather; and tulips from hoar-frosts and heavy rains. Plant out tender deciduous trees and shrubs raised in pots. Remove part of the coverings of all tender shrubs and plants in the first week, and the remainder at the end of the month. Form and repair lawns and grass-walks, by laying turf and sowing perennial grass-seeds.

MAY.

Kitchen Garden.—Sow small salads every week; radishes and lettuces thrice during the month; spinach once a-fortnight; carrots and onions for late drawing; kidney-beans in the first week and last fortnight; peas and beans, cabbages, Brussels sprouts, borecole, broccoli, savoys, and German greens for late crops. The last sowing of cauliflower for the season should be about the 20th. Cardoons may be sown from the middle to the end of the month. Sow pumpkins and cucumbers on a warm border in the last week. Continue the various operations of hoeing and earthing-up the different crops.

Fruit-Trees.—Disbud peaches, nectarines, and other early trees against the walls; also attend to the thinning of fruit. Give occasional washings with the engine to keep down insects. A little brown or Scotch snuff dusted over the trees after watering will effectually destroy greenfly. Pick caterpillars from gooseberries and wall-trees, on their first appearance. Mulch, if not done before, all newly-planted fruit-trees, watering abundantly in dry weather. Remove from raspberries and strawberries all suckers and runners that are not wanted.

Forcing.—Attend to the cultivation of the melon and cucumber frames, regulating the air, heat, moisture, and shade, according to the state of the plants; keeping them free from insects; thinning and training the vines; also renewing the dung-linings when necessary. Continue the planting of fresh beds, raising more young plants from seeds and cutting for late crops; the cuttings producing less luxuriant but more fruitful plants. Go on with the usual culture of the pinery: give abundance of heat and water, and try to keep down all sorts of insects. The grape-vines and peach-trees will require attention, according to the progress they have made, in regulating the young shoots, thinning the fruit, and tying up the shoulders of such clusters of grapes as hang loosely, or are of a large size: Give frequent washings with the engine to the foliage, and a good supply of water to the borders; also abundance of air. Plant out basil. Plant pumpkins and pickling cucumbers, under hand-glasses, on dung ridges, or in those frames that have been used for early vegetables, most of which will be cleared off by the third or last week.

Greenhouse, &c.—Turn out hardy plants about the middle, and the more tender at the latter end, of the month; retaining a part of the finest and most showy plants for the decoration of the greenhouse during the summer and autumn, when the regular inmates are chiefly placed abroad in the garden. Sow tender annuals for succession, potting and shifting those sown at an earlier period, and removing them from the frames to the greenhouse or conservatory as they come into flower. Continue to propagate, by cuttings, the different kinds of plants that are now fit for that purpose, potting off such as are rooted. Remove stage auriculas to their summer quarters, in some shady place with a north exposure. The alpine frame will require little more than a good supply of water, with occasional shiftings, and propagating a few of the early flowering plants. Sow some hardy annuals, and ten-week stocks, for late flowering. Species of Petunia, Tweedia, Tropæolum, and Anagallis; with Maurandya, Rhodochiton, and Lophospermum, may be planted as climbers against trellisses or walls.

Flower Garden.—Sow annuals for succession; biennials in the last week, in the nursery compartment, for planting out next year. Propagate by cuttings dahlias, pansies, double wallflowers, rockets, scarlet lychnis, and lobelias, by dividing the roots. Plant out, during the first week, dahlias, hardy pelargoniums, stocks, calceolarias, and half-hardy annuals, protecting them from slight frosts. By the middle and end of the month masses of such plants as the following may be formed with safety: Pelargoniums, various species and varieties, Heliotropium, Fuchsia, Salpiglossis, Nierembergia, Salvia, Verbena, Bouvardia, Erica, Lobelia. Protect tulips, ranunculuses, and anemones from the midday sun, from rain, and winds. Remove the coverings from all tender plants in the open air; tying up plants where necessary; clearing the walks, borders, and cutting the grass every ten days; for much of the beauty of a flower garden is lost if attention be not given to those operations.

Shrubbery.—Planting out of tender evergreens from pots may be continued; but any other kind of transplanting will be carried on at considerable risk, except in very moist and cloudy weather. Proceed with the laying down of lawns and gravel-walks, keeping the grass short, and the borders and walks free from weeds.

JUNE.

Kitchen Garden.—Sow peas and beans for late crops. The kinds used for early crops are likewise best for this purpose. Sow salading every ten days; also carrots and onions for drawing young. In the beginning of the month sow endive for an early crop. In the first week sow cardoons and turnips for succession; and in the third week for a full autumn crop. Sow scarlet and white runners for a late crop; and in the middle of the month, early cabbages, to be used as coleworts.

Plant full crops of broccoli, Brussels sprouts, savoys, German greens, and leeks; ridge out early celery, and successional crops of cabbage and cauliflower. In the first fortnight of the month, put out cucumber plants, in a warm border, placing hand-glasses over them; these will afford small cucumbers for pickling. Draw and store winter onions.

Fruit-Trees.—Attend particularly to the training and pruning of the summer shoots of all descriptions of wall and trellis trees. Standards do not require this, except those that are trained *en pyramide* or *en quénouille.* Mulch and water fruit-trees and strawberries in dry weather, desisting from watering as soon as the fruit begins to ripen. Net over cherry-trees, to protect the fruit from birds. Destroy insects by frequent washings, and directing tobacco-smoke against them, or by strewing snuff (the fine powder of tobacco) over them. In the first week, plant out love-apples in vacant spaces along the bottom of a south wall.

Forcing.—Proceed with planting melons and cucumbers raised from seeds and cuttings, for late crops. Keep up, by linings, the necessary temperature for ripening of the fruit. Continue the cultivation of the pinery stated for last month; but if you wish very large-sized fruit, and do not care about preserving suckers, remove the whole suckers from the stems and roots, and apply heat and water in abundance. Shift suckers and succession-plants in the beginning and middle of the month, as the state of the plants may require.

Vines and Peaches, &c., may have the same treatment as stated last month. Little water and a good deal of air must be given to those houses where the fruit is beginning to ripen. Those in which the fruit is past, ought to be constantly under a system of thorough ventilation.

The *Greenhouse* will now be occupied with tender greenhouse plants and annuals, and the more hardy plants from the stove, for here these last will remain longer in flower. Shift, repot, and propagate all fine plants, perennials, biennials, or annuals, and cuttings of all sorts that are desirable. Sow fragrant or showy annuals, to flower in pots during winter.

Flower Garden.—Take up bulbs and tuberous roots, and dry them in the shade before you remove them to the storeroom. Fill up with annuals and greenhouse-plants those beds from which the bulbs and roots have been raised. After this season, keep always a reserve of annuals in pots, or planted on beds or thin layers of well-rotted hotbed dung, from which they are easily removed with balls, to fill up any blanks which may occur in the borders or parterre. Sow perennials, if neglected last month, to be planted out in spring. Lay and pipe carnations and·pinks in the end of the month. Pay particular attention to the staking and tying up of every plant that requires it, especially young dahlias, as they are easily destroyed by high winds; in dry weather water abundantly, as many plants are much improved by it, especially dahlias. Attend to the dressing and cleaning of borders and walks, and the mowing of grass lawns.

JULY.

Kitchen Garden.—Sow peas weekly till after the middle of the month, when the last crop for the season may be put in. In the last week, sow yellow turnip for a full winter crop, and spinach for an early winter crop; endive, for autumn and winter crops in the beginning and end of the month; also successional crops of lettuce and small salads. Early cabbages for coleworts should be sown in the first week.

Plant full crops of celery and celeriac about the middle and end of the month; late crops of broccoli, cauliflower, and coleworts, in the last week. Gather and dry medical and pot herbs; also propagate such by slips and cuttings.

Fruit-Trees.—Continue the summer pruning and training of all wall and espalier-rail trees, with the destruction of insects. All heavy or over-abundant crops of fruit ought to be thinned, as otherwise not only are the size and quality of the fruit deteriorated, but the trees exhausted and injured. Plant strawberries in pots, for forcing next winter. Propagate different sorts of fine fruit-trees, by budding on other trees, or on prepared stocks.

Forcing.—Attend to the pruning of melons and cucumbers, giving air and water, renewing linings, &c. Go on with the usual cultivation of the pinery, but withhold water from the plants when the fruit begins to ripen. Have the old plants with suckers on them put into a brisk bottom-heat, giving proper supplies of water; this will increase their size very much, and materially shorten the period of their coming into fruit. The forcing-houses ought to have the same treatment as stated for last month.

In the *Greenhouse*, little alteration will take place in the culture and management from that given for last month; necessary attention being paid to potting, shifting, and putting in cuttings, and giving abundance of water to the potted plants, both in the house and out of doors.

Flower Garden and Shrubbery.—Take up the remainder of tuberous roots, such as anemone and ranunculus; finishing by the end of the first week; fill up their places, and any vacancies that may have occurred, with annuals from the reserve ground. Propagate all the finer herbaceous plants that have gone out of flower, by means of cuttings and slips; also select roses and American shrubs, by layering, budding, or cuttings. Go on with the laying, piping, and striking of carnations, pinks, pansies, and the different varieties of subperennial plants, as Sweet-William, pink, catchfly, double rocket, and double wallflower, in hand-glasses, or in shaded situations. Attend to the staking and tying up of dahlias and strong herbaceous plants. Great attention must now be paid to cleaning in every department, weeds springing up after every shower.

AUGUST,

In the *Kitchen Garden*, sow winter and spring spinach in the beginning and about the middle of the month; parsley and winter onions, for a full crop, in the first week; cabbages, cauliflower, savoys, and German greens, about the middle of the month, for planting out in spring; lettuce in the first and last week; small salads occasionally; black Spanish, red and white radish, for winter crops.

Plant and earth up celery and endive. Plant strawberries. A few coleworts may still be put in.

Fruit Garden.—Proceed in the training and regulation of summer shoots of all fruit-trees, as directed for the last three months. Attend to the thinning of the fruit where necessary. Mat up, in dry weather, gooseberry and currant bushes, to preserve the fruit till late in the autumn. Every exertion must now be used by the gardeners to preserve the ripening fruit on the walls from insects, and to destroy wasp nests.

Forcing.—The same routine of cultivation in hot-beds and pits may be proceeded in as stated for last month. Sow, and propagate by cuttings, in the beginning of the month, cucumbers, to be afterwards grown in hot-water pits, or in boxes in the front of the pine-stove, for a winter crop. In the pinery most of the fruit will be cut by the middle of the month, when a general shifting of succession-plants should take place; as also a potting of suckers; but these will be strengthened by being allowed to remain on the old plants until the end of this month. In the forcing-houses where the crops are past, part of the sashes may be removed, so as to permit thorough ventilation.

Greenhouse.—Attend to the propagation of all sorts of greenhouse plants by cuttings, and to the replacing in the greenhouse and stoves the more tender species, by the end of the month in ordinary seasons, but in wet weather in the second week. Sow half-hardy annuals, as Clarkia, Schizanthus, Coreopsis, &c., to flower during winter. Also begin to propagate the various species of the half-hardy greenhouse plants, noticed under

February, for decorating the flower-garden in the following summer.

Flower-Garden and Shrubbery.—Sow in the second and the last week, on a warm border of a light, sandy soil, with an east aspect, for planting out in spring, Clarkia pulchella, pulchella alba, Gilia capitata, Collomia coccinea, Coreopsis tinctoria, Œnothera Lindleyana, roseo-alba, Romanzovii, Collinsia verna, grandiflora, bicolor, Eutoca viscida, Leptosiphon densiflorus, Nemophila insignis, Eschscholtzia californica, &c. Sow auricula and primula seeds in pots and boxes. Propagate all sorts of herbaceous plants by rooted slips; lay chrysanthemums: in the first week take off layers of carnations, pinks, and pansies. Transplant evergreens in moist weather, about the end of the month; and propagate them by layers and cuttings.

SEPTEMBER.

Kitchen-Garden.—Sow a few small salads for late crops; lettuce, parsley, and spinach, if not done last month, for spring crops. Plant endive and lettuce. If broccoli be too strong or tall to withstand the winter, lift them and lay them nearly up to the neck in the earth. Lift onions, and lay them out to win on a dry border or gravel walk. Lift potatoes and store them.

Fruit-Trees, &c.—Finish the summer pruning and training. Assist the maturing of the fruit, and, what is equally important, the ripening of the young wood for next year, of peaches and nectarines on hot walls, with fires during the day. Gather and lay up in the fruit-room with care the autumnal sorts of apples and pears. In the first week, plant strawberries for a main crop next season.

Forcing.—Take care that late crops of melons and cucumbers be not injured by damping, from getting too much water and too little air. In the pinery the usual routine of cultivation may be carried on; in the first week take off and pot all strong suckers, if not done in the middle of last month; the remainder may be taken off at the end of the month, and planted in old tan in a frame or pit prepared for that purpose; in this way they will be found to keep much better over the winter, and to be better supplied with roots than if they had been potted, which ought never to be done after this season. Expel damp, and assist the ripening of late crops of grapes and peaches, with fires during the day. Prune early grape-vines and peaches.

Greenhouse, Conservatory, &c.—All repairs of painting or glazing ought to be finished by the first week, as many plants will require to be taken into the houses by the 20th of the month; in ordinary seasons, comparatively few greenhouse-plants can be trusted in the open air after this period. Pelargoniums and half-hardy greenhouse plants may be kept in frames or in sheltered situations until the end of October. Pot hyacinths, polyanthus narcissus, and tulips for forcing. The same attention must be given to the propagation of half-hardy greenhouse-plants (see February) as directed for last month. Remove stage auriculas to the winter frames about the middle of the month; also tender alpine plants, keeping the glass-frames shut in wet weather. Early in this month replace in the stove all succulents that may have been kept in the greenhouse or in the open air during the summer months.

Flower-Garden, &c.—Sow in the beginning of this month all half-hardy annuals stated for last month, if not done at that time. Sow also the different species of primula, and the seeds of all such plants, for, if sown in spring, they seldom come up the same season, but if sown in September or October, they vegetate readily in the succeeding spring. Continue the propagation of herbaceous plants, taking off the layers of carnations, pinks, and pansies, and putting them into a nursery-bed for the winter. Pot chrysanthemum layers by the end of the month. Keep all dahlias and tall herbaceous plants properly staked and tied up, as they are very liable to be broken by high winds at this season. The same attention must be given to the cleaning and dressing of this department as directed for the former months. Plant evergreens; make layers, and put in cuttings of most of the hard-wooded sorts of shrubby plants, about the middle and end of the month, as many will succeed better at that season than if these operations were delayed to a later period.

OCTOBER.

Kitchen-Garden.—Sow small salads and radishes in the first week; Mazagan and Marshall's dwarf beans and early frame peas (Warwick variety) in the last week. If the winter prove mild they will be somewhat earlier than those sown next month or in January. Prepare and make up mushroom-beds.

Plant early cabbages in close rows for spring use. A bed of cauliflowers in the last week, to receive the protection of a three-light frame; or, at any rate, plant cauliflower at the bottom of a high wall or hedge in a sheltered situation. Earth up celery and cardoons.

Store potatoes, beet, salsify, scorzonera, skirret, carrots, parsnips, by the end of the month.

Fruit-Garden.—Such fruit-trees as have dropped their leaves may be transplanted. Protect fig-trees, if the weather prove frosty, as soon as they have cast their leaves. Cover late crops of grapes on hot walls with woollen nets or mats, to prevent injury from frost. Store and lay up very carefully during the month all sorts of apples and pears, the longest-keeping sorts not before the end of the month, if the weather is mild : a part of them may be placed in a close cellar.

Forcing.—Assist hotbeds and pits with fresh linings, to keep up the declining heat of such as have not ripened their crops. Late vineries and peach-houses will still require the application of fire-heat to ripen the wood; for if this be not accomplished, the next crop will be inferior both in quantity and quality. Give abundance of air to the pinery in good weather, gradually lowering the heat. Prune and dress early vines and peaches; clean and repair the forcing-houses and their flues; continue the preparation and formation of mushroom-beds.

Greenhouse.—Replace all sorts of greenhouse-plants at an early period, as many of them are often much injured by cold rains and frosty mornings at this season. Fill the pits with pots of stocks, mignonette, and hardy annuals, for planting out in spring, along with many of the more hardy sorts of greenhouse-plants. The whole ought to be thoroughly ventilated, except in frosty weather. Water sparingly. Begin to force roses, hyacinths, and a few other bulbs, for winter and early spring decoration.

Flower-Garden.—Sow a few sorts of hardy annuals in a frame, or on a sheltered border, for spring use, as directed for August.

Plant the greater part of the common border bulbs about the end of the month, with a few anemones for early flowering. Transplant strong plants of biennials and perennials to their final situations.

Protect alpine plants, stage auriculas and carnations, with glass frames; half-hardy greenhouse-plants, such as fuchsias, &c., about the end of the month, with coverings of broom or spruce-fir, preferring the latter. Take up, dry, and store dahlias and tigridia tubers in the end of the month; pot lobelias from the open borders.

Transplant all sorts of hardy evergreens and shrubs, noticing in dry soils to give abundance of water. Put in cuttings of all sorts of evergreens. Attend to the removal of decayed plants, leaves, and rubbish from the walks and borders.

NOVEMBER.

Kitchen-Garden.—Sow early frame peas, preferring the Warwick variety, and mazagan beans, in the second week, for an early crop. Protect endive, celery, artichoke, sea-kale, with stable-litter or ferns; mulch asparagus with hotbed dung; take up endive, late cauliflower, early broccoli, and lettuces, and lay them in an open shed, or in old cucumber and melon pits, which will protect them from frost, and afford a supply during winter. Force rhubarb and sea-kale in the open border, under boxes or cases, surrounded and covered with well-fermented stable-litter.

Fruit-Garden.—Plant all sorts of fruit-trees in fine weather, giving an abundant supply of water to settle the earth about the roots. Commence and carry on the various operations of pruning and nailing when the weather may permit. Take off such late sorts of apples and pears as may remain on the trees, and lay them carefully in the fruit-room; which place will require frequent examination, and the removal of all decayed fruit.

Forcing.—In hotbeds and pits keep up the requisite degree of heat by frequent additions to the linings. Cucumbers and pines, on hotbeds, will require more than ordinary attention, to prevent them damping off from too much moisture. Where hot-water pipes are employed for heating, the necessary temperature and dryness are much more under the control of the gardener. Force asparagus, rhubarb, and sea-kale, in the mushroom-house or pits for a supply at Christmas. Attend to the forcing of mushrooms. In the forcing-houses, prune and train the trees; dig and dress the borders of those houses in which this operation has not already been done. The forcing of vines is sometimes commenced at this season; but the progress must be very slow at first; the crops resulting from such early forcing are generally inferior in quantity.

Greenhouse, &c.—All hardy greenhouse-plants must now be properly protected, by being replaced in the greenhouse or in pits. Give abundance of air in fresh weather, only applying heat to keep out the frost during the night, or to expel the damp, with the assistance of air through the day; remove all decayed or injured leaves, watering only such plants as require it; the plants in the alpine and auricula frames ought still to have plenty of air, but very little water. Commence the forcing of rhododendrons, kalmias, roses, hyacinths, tulips, in the stove or in pits.

Flower-Garden, &c.—Plant dried tubers of border flowers, but the finer sorts had better be deferred till spring. Protect such half-hardy plants as were not sheltered last month. Plant deciduous trees and shrubs as long as the weather continues favourable. Dig and dress such flower-borders and shrubberies as may now be cleared of annuals and the stems of herbaceous plants.

DECEMBER.

Kitchen and Flower Garden.—About Christmas, sow a few of the same sorts of peas and beans as in November. Very few operations can be carried on during this month, with the exception of trenching and digging in dry weather; but this ought not to be neglected.

Plant all sorts of fruit-trees in mild weather. Proceed with pruning and nailing wall-trees, whenever an opportunity occurs. Examine the fruit-room every week, removing the fruit found in a state of decay.

Forcing, &c.—Go on with the usual culture of those houses which have been commenced, or are now put into operation, attending to the necessary degrees of heat, &c.; the same attention to hotbeds and pits will be necessary as in the last month. Continue the forcing of asparagus, rhubarb, sea-kale, and mushrooms, in pits, or in the mushroom-house.

Greenhouse, &c.—The directions for last month will be found equally applicable for this.

Flower-Garden, &c.—The directions for last month will also be found applicable to this. Rake and sweep leaves from lawns and gravel-walks, repairing the latter as occasion may require.

INDEX.

PAGE

Airing of hothouses, ... 141
Alderstone melon-pit, ... 195
Almond-tree, culture of the, ... 76
American ground, plants for the, 269
Anemone, culture of the, ... 303
Annuals recommended, ... 290
Aphides, wash to destroy, ... 76
Aphis, American, to destroy, ... 107
Apples, dessert, kinds recommended, ... 101
  kitchen, recommended, ... 103
Apple-tree, culture of the, ... 105
Apricots, kinds of, to be preferred, ... 79
Apricot-tree, on the management of the, ... 78
Artichokes, culture of, ... 247
Asparagus, culture of, ... 241
  forcing of, ... 243
Atkinson's melon-pit, ... 196
Auricula, culture of the, ... 310

Beans, garden, kinds, and culture, ... 220
Beet, red, culture of, ... 230
  white, ... 239
Bergamot pears, ... 90
Beuerré brown, ... 91
  d'Aremberg, ... 93
  Diel and Rance, ... 95
Biennials, ornamental, recommended, ... 289
Blossom, protecting of, in fruit-trees, ... 52
Borecole, kinds, &c., ... 212
Broccoli, culture of, ... 216
Brussels sprouts, ... 213
Budding, propagation by, ... 37

PAGE

Cabbage, kinds and culture, ... 210
Capsicum or chilly, ... 258
Camellias, cultivation of, ... 324
Cardoons, culture of, ... 248
Carnations, cultivation of, ... 313
Carrots, kinds and culture, ... 229
Cauliflower, culture of, ... 214
Celery, culture of, ... 255
Celeriac, culture of, ... 257
Cherries, kinds of, ... 83
Cherry-house, management of the, ... 167
Cherry-tree, pruning and training of the, ... 86
Chestnut-tree, ... 113
Chicory, culture of, ... 253
Chrysanthemum sinense, cultivation of, ... 317
Cider, manufacture of, ... 105
Citron des Carmes, pear, ... 88
  fruit-tree, ... 171
Climbing shrubs, ornamental, recommended, ... 278
Clingstone peaches, ... 66
  nectarines, ... 67
Colmar and Passe Colmar fine pears, ... 94
Conservatory, general structure of the, ... 325
  plants, ... 326
Corbett's hot-water system, ... 142
Couper's large red plum, ... 81
Cranberries, culture of, ... 124
Crasanne pear, ... 93
Cress, garden, raising of, ... 257
Cucumbers, kinds and culture of, ... 202
Currants, red and white, ... 113

PAGE
Currants, black, 114
Curvilinear roofs, 151
Cuttings, propagation by, 30

Dahlia, cultivation of the, 298
Damson plums, 82
Doyenné pear, 90
Dry-stove plants, 321
Dwarf wall-trees, 41

Easter beurré pear, 94
Edgings for flower-borders, 273
Endive, culture of, 252
Epiphytes, cultivation of, 359
Ericæ, cultivation of, 318
Espalier-rails, 17
  trees, training, 44

Fan-training of fruit-trees, 47
Fences of garden, 12
Fennel and Finochio, 258
Fig-house, general management of the, 168
Figs, kinds and culture, 59
Filbert, 111
Florists' flowers, 294
Flower garden, situation and form of, 264
  soil for, 270
  walks, 271
Flues, construction of, 127
Forcing department, 126
Freestone peaches, 66
Frontignac grapes, 54
Fruit, protection of, 52
Fruit garden, general management of, 25
  house, 108
Furnaces, plans of, 129, 130

Galande peach, 65
Gansel's Bergamot, 92
Garden, general, proper size, situation, &c., 8
Garden inclosure-walls, 13
  soil, manures, &c., 18
  internal arrangement, 21
Garlic, culture of, 238
Gean tree, 85
Gherkins for pickling, 203
Gooseberries, kinds and culture of, 115
Gourds, cultivation of, 204

PAGE
Gowan's mode of grafting grape-vines, 160
Grafting, propagation by, 32
Grape-vines, kinds recommended, 54
Grape-vines, forcing of, 161
  grafting of, 160
Gravel for garden-walks, 272
Greengage plum, 79
Greenhouse, structure of, 319
  plants recommended, 321
Guava fruit-tree, 166
Guigne-trees, 85

Haricots, 221
Hazel-bush, culture of, 111
Heath-house, 321
Heaths, hardy, list of, 269
Heating of glazed houses by steam, 130
Heating by hot water, 135
Herbaceous ornamental plants recommended, 281
  vernal, 285
  summer, 287
  autumnal, 288
Herbs, sweet, list of, 259
Horizontal training of wall-trees, Hitt, &c., 45
Horse-radish, culture of, 258
Horticultural Societies, notices of, 4
Hotbed frames, 194
Hothouses, airing of, 141
  best slope of roof for, 147
Hyacinths, cultivation of, 294

Indian cress, tuberous, 234
Insects, destroying of, 107, 323
Introduction, 1
Iris, cultivation of the, 304

Jargonelle pear, 88
Jasmine, 275
Jerusalem artichoke, 227

Kale, culture of, 212
Kalendar, monthly, 335
Kentish cherry, 84
Kidney-beans, culture of, 221
Knight's theory regarding the age of fruits, 27
  new apples, 101

PAGE
Knight's new pears, 95
Kohl-rabi, culture of, 214

Lawson's "Synopsis of Vegetable Products," utility of, shewn, 223
Layers, propagation by, 31
Leeks, culture of, 237
Lettuce, kinds and culture, 251
Light, necessity of, in glazed houses, 147
Lilies, cultivation of, 306
Lobelia, kind for flower garden, 316
Longueville pear, 89
Loudon's Encyclopædia recommended, 5
    Hortus Britannicus recommended, 321

Magdalene peach, 64
Manures for gardens, 19
Marie-Louise pear, 92
Mayduke cherry 83
Medlar-tree, culture of, 109
Melonry and melon-pits, 194
Melons, kinds and culture, 197
Montreuil peach-training, 71
Moorfowl egg pear, 91
Moorpark apricot, 77
Morello cherry, 85
Mulberry-tree, culture of, 110
Muscat grapes, 55
Mushrooms, culture of, 205
Mustard, culture of, 257

Narcissus, cultivation of, 304
Nectarines, kinds and culture, 66
New Zealand spinach, 239
Noblesse peach, 65

Oldacre's mushroom-bed, 205
Onions, kinds and culture, 234
Orangery, general management of the, 168
Orchard, site, culture, &c., 23
Orchidaceæ, tropical, 329
Oxalis roots, culture of, 232

Parsnips, culture of, 230
Parsley, culture of, 255
Peaches, kinds and culture, 63
Peach-house, structure and management of, 162

PAGE
Pears, fine kinds, early, 88
    late, 91
Pear-tree, management of, 96
Pease, kinds and culture, 218
Peat-soil for flower garden, 271
Pelargoniums, 323
Perennials, tall ornamental, 281
Pine-apples, kinds of, 192
    pits and culture, 173
Pinks, cultivation of, 315
Plant-stove, structure of, 327
    inmates of, 328
Planting of fruit-trees, 39
Plums, kinds and culture, 79
Polyanthus, cultivation of, 312
Potatoes, kinds and culture, 223
    forcing of, 226
Primula, cultivation of, 310
Providence, New, pine-apple, 193
Pyramide training, 43

Queen pine-apple, 192
Quenouille training, 43
Quince-tree, culture of, 108
Quinoa spinach, culture of, 240

Radish, culture of, 231
Rampions, culture of, 249
Ranunculus, cultivation of, 301
Raspberries, kinds and culture of, 117
Rendle's tank heating, 143
Rider wall-trees, 41
Rock-work, 267
    plants recommended for decorating the, 267
Roger's conical boiler, 137
Rosary, management of the, 279
Rhubarb, kinds and culture, 249

Salad herbs, 251
Savoy greens, culture of, 213
Scallions, mode of producing, 235
Scions, the preparing of, for grafting, 33
Scorzonera, culture of, 231
Sea-kale, culture and forcing of, in open border, 244
Seed, mode of raising fruits from, 25
Seedling-fruits, raising of, 39
Service-tree, culture of, 109
Seymour's peach-training, 73

PAGE
Siphon employed in hot water circulation,............... 140
  use of, in heating by hot water,..................... 141
Shaddock-fruit, culture of,.... 172
Shallot, culture of............... 237
Shelter, necessity and means of, 10
Shrubs, ornamental, recommended,................... 274
Situation for fruit-garden, &c., selection of,.............. 8
Skirret, culture of,.............. 231
Soil, best for kitchen garden, 18
  for flower garden,......... 270
Sorrel, common and French, 258
Spinach, culture of,............ 238
Standard fruit-trees, training of, 43
Steam, use of, for heating glazed houses,..................... 130
Stocks for fruit-trees,............ 33
Strawberries, kinds and culture of,........................... 118
  forcing of.................... 123
Sweet herbs,...................... 257
Syrian grape,....................... 57

Tanks, heating by means of, 143
Tetragonia, culture of,.......... 239
Tobacco-water,.................... 323
Training of fruit-trees,......... 42

PAGE
Trenching, advantages of,...... 19
Tulips, cultivation of,.......... 297
Turnips, kinds and culture,... 227

Verdelho grape,................... 57
Vernal plants,...................... 285
Vinery, structure of the,........ 154
  training of vines in the,... 157
Vines, grape, sorts cultivated, 54
Violets, sweet,...................... 316

Walks, garden, forming of,.... 271
Walls, inclosure,.................. 18
Walls, hot,........................... 16
Wall-borders,....................... 22
Wall-trees, training of,........... 44
Walnut-tree, general management of the,......... ... 112
Wash for fruit-trees,............ 323
Washington plum,................ 80
Water, necessity of a supply of, 11
Water, hot, for heating glazed houses,.................... 135
West's melon-pit,................. 195
Winter garden,..................... 269
Witty's furnace,................... 129

Yair, green pear of,.............. 89

Zante, or Corinth grape, ... 56

THE END.

PRINTED BY NEILL AND COMPANY, EDINBURGH.

A

CATALOGUE OF WORKS

PUBLISHED BY

ADAM AND CHARLES BLACK,

EDINBURGH.

INDEX.

PAGE
Encyclopædia Britannica 1–19
Religious Works 20–24
Medical and Surgical Works 25–27
Atlases 28–29
Educational Works 30
Sir Walter Scott's Works 31–34
Guide Books 35–37
Works on Gardening and Botany 38
Miscellaneous Works 39–44
Maps 45

ENCYCLOPÆDIA BRITANNICA,

EIGHTH EDITION.

Now Publishing in Monthly Parts, price 6s, and Quarterly Volumes, price 24s.

LIST OF SOME OF THE CONTRIBUTORS.

Rt. Hon. Lord Macaulay.

Rt. Rev. Richard Whately, D.D., Archbishop of Dublin.

Rt. Rev. R. Dickson Hampden, D.D., Bishop of Hereford.

William Whewell, D.D., Trinity College, Cambridge.

Sir David Brewster, K.H., LL.D., Principal of the United Colleges of St Salvator and St Leonard, St Andrews.

Richard Owen, Esq., F.R.S.

John Lee, D.D., Principal of the University of Edinburgh.

Sir William Hamilton, Bart.

Sir Archibald Alison, Bart.

Sir John Richardson.

Right Hon. Sir John M'Neill, G.C.B., &c.

Henry Rogers, Esq., Author of the "Eclipse of Faith," &c.

Isaac Taylor, Esq., Author of the "Natural History of Enthusiasm," &c.

Rev. Charles Kingsley, Author of "Hypatia," "Westward Ho," &c.

J. D. Forbes, Professor of Natural Philosophy in the University of Edinburgh, &c. &c.

Robert Stephenson, Esq., M.P., President of the Institution of Civil Engineers, &c.

Richard Monckton Milnes, Esq., M.P.

Hepworth Dixon, Esq.

Theodore Martin, Esq.

Colonel Portlock, R.M.A.

David Masson, M.A., Professor of English Literature in University College, London.

George Wilson, M.D., Professor of Technology in the University of Edinburgh.

Rev. William Scoresby, LL.D., &c.

Robert Carruthers, Esq.

John Hill Burton, Esq.

J. B. Jukes, Esq., M.A., Vice-President of the Geological Society of Dublin.

William Hosking, Professor of Arts and Construction, King's College, London.

Alexander Smith, Esq., Author of "A Life Drama," &c.

Rev. William Hanna, LL.D.

Rev. Robert Main, M.A., F.R.A.S., &c.

John Tulloch, D.D., Primarius Professor of Divinity, St. Andrews.

Charles Maclaren, Esq., F.R.S.E., &c.

J. L. Ricardo, Esq., M.P.

Leonhard Schmitz, LL.D., F.R.S.E., &c.

Edward Thornton, Esq., Author of "Gazetteer of India," &c.

George Ferguson, LL.D., Professor of Humanity, King's College, Aberdeen.

James Pillans, M.A., Professor of Humanity in the University of Edinburgh.

F. Crace Calvert, Professor of Chemistry, Royal Institution, Manchester.

Robert Christison, M.D., Professor of Materia Medica in the University of Edinburgh.

R. S. Poole, Esq., M.R.S.L., &c.

John Barrow, Esq., Admiralty.

Joseph D. Hooker, M.D., R.N.

Charles Tomlinson, Esq., Editor of a "Cyclopædia of Useful Arts," &c.

W. L. Alexander, D.D.

Thomas Bazley, Esq., Chairman of the Chamber of Commerce, Manchester.

W. H. Langley, Esq., Editor of "Bell's Life in London."

Charles Macintosh, Esq., Author of the "Book of the Garden."

T. C. Archer, Esq., Author of "Popular Economic Botany."

J. P. Lacaita, Esq.

Arthur Ashpitel, Esq.

A. V. Kirwan, Esq.

William Blair, Esq.

BENJAMIN ROBERT HAYDON, Esq.

J. Y. SIMPSON, M.D., Professor of Midwifery in the University of Edinburgh.

THOMAS DE QUINCEY, Esq.

R. G. LATHAM, Esq., M.A., M.D., &c.

W. E. AYTOUN, Professor of Rhetoric and Belles Lettres in the University of Edinburgh.

J. R. M'CULLOCH, Esq., Member of the Institute of France, &c.

AUGUSTUS PETERMANN, Esq., F.R.G.S., &c.

WILLIAM SPALDING, M.A., Professor of Logic and Metaphysics in the University of St. Andrews.

JOHN FRANCIS SMITH, Esq.

Rev. J. E. RYLAND, M.A., &c.

Rev. P. KELLAND, M.A., Professor of Mathematics in the University of Edinburgh.

ANTONIO PANIZZI, Esq.

THOMAS ANDERSON, M.D., Professor of Chemistry in the University of Glasgow.

Dr. DORAN, Author of "Habits and Men," &c.

WILLIAM FAIRBAIRN, Esq., C.E., Manchester.

H. L. MANSEL, Reader in Moral and Metaphysical Philosophy, Magdalen College, Oxford.

JAMES CAIRD, Esq., Author of "English Agriculture in 1850-51," &c.

THOMAS LAYCOCK, M.D., Professor of the Practice of Physic in the University of Edinburgh.

DANIEL WILSON, LL.D., F.R.S.A., &c.

LAWRENCE OLIPHANT, Esq., Author of the "Russian Shores of the Black Sea."

GEORGE FARQUHAR GRAHAM, Esq.

JOHN FLEMING, D.D., Professor of Natural Science, New College, Edinburgh.

E. B. DENISON, Esq., M.A., Q.C., &c.

Rev. JOHN CAIRNS, M.A.

J. H. BALFOUR, M.D., Professor of Botany in the University of Edinburgh.

J. S. BLACKIE, Professor of Greek in the University of Edinburgh.

JAMES MONTGOMERY, Esq., Author of "Greenland and other Poems," &c.

WILLIAM GREGORY, M.D., Professor of Chemistry in the University of Edinburgh.

Sir JOHN F. W. HERSCHELL, Bart., K.H., M.A., D.C.L., &c.

D. F. ARAGO, late Member of the Royal Institute of France.

JOHN ROBISON, LL.D., late Professor of Natural Philosophy in the University of Edinburgh.

Sir WALTER SCOTT, Bart.

C. C. J. BUNSEN, D.D., D.C.L., D.P.H.

Lord JEFFREY.

THOMAS YOUNG, M.D., late Corresponding Member of the Royal Institute of France.

Sir JOHN LESLIE, late Professor of Natural Philosophy in the University of Edinburgh.

Sir JOHN BARROW, Bart.

JOHN PLAYFAIR, F.R.S., late Professor of Natural Philosophy in the University of Edinburgh.

The Right Hon. Sir JAMES MACKINTOSH, LL.D., &c.

DUGALD STEWART, F.R.S.S. L. and E.

Sir JAMES E. SMITH, F.R.S., late President of the Linnean Society.

JEAN BAPTISTE BIOT, Member of the Royal Institute of France.

Right Rev. GEORGE GLEIG, D.D.

Lieut.-Col. CHARLES HAMILTON SMITH, F.R.S.

W. M. RANKINE, Professor of Mechanics in the University of Glasgow.

Sir JOHN GRAHAM DALYELL, Bart.

ROBERT JAMESON, F.R.S., late Regius Professor of Natural History in the University of Edinburgh.

ALAN STEVENSON, Esq., F.R.S.E., C.E.

EDWARD EDWARDS, Esq.

ENCYCLOPÆDIA BRITANNICA,

EIGHTH EDITION

PRINCIPAL SUBJECTS.

VOLUME I.

DISSERTATION FIRST.—On the Progress of Metaphysical and Ethical Philosophy, since the Revival of Letters in Europe. By DUGALD STEWART, late Professor of Moral Philosophy in the University of Edinburgh.

DISSERTATION SECOND.—On the Progress of Ethical Philosophy, chiefly during the Seventeenth and Eighteenth Centuries. By Sir JAMES MACKINTOSH, LL.D. With a Preface by WILLIAM WHEWELL, D.D.

DISSERTATION THIRD.—On the Rise, Progress, and Corruptions of Christianity. By RICHARD WHATELY, D.D., Archbishop of Dublin.

DISSERTATION FOURTH.—On the Progress of Mathematical and Physical Science since the Revival of Letters in Europe. By Sir JOHN PLAYFAIR, late Professor of Natural Philosophy in the University of Edinburgh.

DISSERTATION FIFTH.—On the Progress of Mathematical and Physical Science, chiefly during the Eighteenth Century. By Sir JOHN LESLIE, late Professor of Natural Philosophy in the University of Edinburgh.

DISSERTATION SIXTH.—On the Progress of Mathematical and Physical Science during the Nineteenth Century. By JAMES D. FORBES, Professor of Natural Philosophy in the University of Edinburgh.

VOLUME II.

ABERRATION and ACOUSTICS. By GEORGE BUCHANAN, F.R.S.E.

ACHROMATIC GLASSES and AERONAUTICS. By Sir JOHN LESLIE.

ADMIRAL and ADMIRALTY. By Sir JOHN BARROW, Bart Revised by JOHN BARROW, Admiralty.

ADDISON,(JOSEPH.) By WILLIAM SPALDING, A.M., Professor of Logic in the University of St Andrews.

ÆSCHYLUS. By J. S. BLACKIE, Professor of Greek in the University of Edinburgh.

ÆTNA and ALPS. By ROBERT JAMESON, late Professor of Natural History in the University of Edinburgh.

AFGHANISTAN. By DAVID BUCHANAN and EDWARD THORNTON, East India House.

AFRICA. By AUGUSTUS PETERMANN, F.R.G.S.

AGRICULTURE. By JOHN WILSON, Eddington Mains, Berwickshire.

AGRICULTURAL CHEMISTRY. By THOMAS ANDERSON, M.D., Professor of Chemistry in the University of Glasgow.

AGRARIAN LAWS. By GEORGE FERGUSON, Professor of Humanity, King's College, Aberdeen.

ALGEBRA. By WILLIAM WALLACE, LL.D., late Professor of Mathematics in the University of Edinburgh.

AMERICA. By CHARLES MACLAREN, F.R.S.E.

ANATOMY. By DAVID CRAIGIE, M.D., F.R.S.E.

Abbreviation—Abyssinia—Academy—Algiers—Alphabet —Alum.

VOLUME III.

ANATOMY. By David Craigie, M.D., F.R.S.E.

ANCHOR. By Jonathan Aylen, Greenwich.

ANDES, ANGLE, &c. By Sir John Leslie.

ANGLING, ANIMAL KINGDOM, and ANIMALCULE. By James Wilson, Author of various works on Natural History.

ANNUITIES. By Joshua Milne.

ANT. By P. M. Roget, M.D., F.R.S.

ANTRIM and ARMAGH. By Henry Senior.

APPARITIONS. By James Browne, LL.D.

AQUEDUCT By George Buchanan, C.E.

ARABIA By D. Buchanan and W. Plate, LL.D.

ARCH. By John Robison, late Professor of Natural Philosophy in the University of Edinburgh, and William Wallace, LL.D.

ARCHÆOLOGY. By Daniel Wilson, LL.D.

ARCHITECTURE. By William Hosking, Professor of Arts and Construction, King's College.

ARISTOTLE and ARISTOTLE'S PHILOSOPHY. By R. Dickson Hampden, D.D., Bishop of Hereford.

ARMY. By J. Browne, LL.D., and J. H. Stocqueler.

ARTILLERY. By Capt. Spearman and Colonel Portlock.

ARTS. By W. Hazlitt and W. B. Johnstone, R.S.A.

ASIA. By H. Murray, F.R.S.E., and W. Plate, LL.D.

ASSAYING. By Robert Mushet, of the Royal Mint.

ASTRONOMY. By Thos. Galloway. Sir John Playfair, and Thos. Henderson. With Supplement by Rev. Robert Main, Royal Observatory, Greenwich.

Archery—Arithmetic.

VOLUME IV.

ASTRONOMY. By THOS. GALLOWAY, Sir JOHN PLAYFAIR, and THOS. HENDERSON. With Supplements by Rev. R. MAIN, Royal Observatory, Greenwich.

ATHENS and ATTICA. By JAMES BROWNE, LL.D. Revised by Dr L. SCHMITZ, F.R.S.E., Rector of the High School of Edinburgh.

ATMOMETER, BAROMETER, and BAROMETRICAL MEASUREMENTS. By Sir JOHN LESLIE. With Supplements.

ATMOSPHERE. By THOMAS THOMSON, late Professor of Chemistry in the University of Glasgow.

ATTERBURY. By the Right Hon. THOMAS BABINGTON MACAULAY.

ATTRACTION. By JAMES IVORY, F.R.S.

AURORA BOREALIS. By ROBT. JAMESON, F.R.S., late Professor of Natural History in the University of Edinburgh.

AUSTRALASIA and AUSTRALIA. By Sir JOHN BARROW. With continuation by SAMUEL MOSSMAN, Author of the "Gold Fields of Australia," &c.

AUSTRIA. By EMERIC SZABAD, Author of "Hungary, Past and Present."

AVERAGE. By JOHN WARRACK, Average Stater.

BACON. By WILLIAM SPALDING, Professor of Logic in the University of St Andrews.

BAKING, BLEACHING, &c. By JAMES STARK, M.D., F.R.S.E.

BAILLIE, BARBOUR, BALLAD, BARCLAY, &c. By DAVID IRVING, LL.D.

BALANCE OF POWER and BIBLIOGRAPHY. By MACVEY NAPIER, late Professor of Conveyancing in the University of Edinburgh.

BALLAT, BANKRUPTCY, and BENTHAM. By J. H. BURTON, Author of the "History of Scotland," &c.

BASKET-MAKING. By Sir J. G. DALZELL.

BATHING, BECCARIA, &c. By THOMAS YOUNG, M.D.

BENGAL. By EDWARD THORNTON, East India House.

BEAUTY. By LORD JEFFREY.

BEE. By JAMES WILSON, F.R.S.E.

VOLUME IV.—*Continued.*

BEETHOVEN. By GEORGE FARQUHAR GRAHAM.

BELGIUM.

BELL, (SIR CHARLES.) By Sir JOHN M'NEILL.

BIBLE and BIBLE SOCIETIES. By Rev. JAMES TAYLOR, D.D.

BLACK SEA. By LAWRENCE OLIPHANT, Author of "The Russian Shores of the Black Sea."

BLASTING. By ROBERT and THOMAS STEVENSON, Civil Engineers.

BOHEMIAN BRETHREN. By JAMES MONTGOMERY, Author of "Greenland and other Poems."

BOLIVIA.

Babylon—Baptism—Bernouilli—Blind—Block-Machinery —Blowpipe.

VOLUME V.

BOOKBINDING. By CHARLES MARTEL.

BOMBAY, BURMAH, &c. By EDWARD THORNTON, East India House.

BOOK-KEEPING. By JOSEPH LOWE.

BORNEO and BORNOU. Revised by AUGUSTUS PETERMANN, F.R.G.S., &c.

BOTANY. By JOHN HUTTON BALFOUR, M.D., Professor of Botany in the University of Edinburgh.

BRAHMINS. By JAMES BROWNE, LL.D.

BRASS. By CHARLES SYLVESTER, C.E.

BRAZIL.

BREAKWATER. By Sir JOHN BARROW, Bart. Revised by JOHN BARROW, Admiralty.

BREWING. By JAMES STARK, M.D., F.R.S.E.

BRICKMAKING. By SAMUEL HOLMES, Liverpool.

BRIDGE. By THOMAS YOUNG, M.D., F.R.S.

BRITAIN. By JAMES BROWNE, LL.D., with continuation.

BRUCKER. By Sir WILLIAM HAMILTON, Bart.

BUILDING. By WILLIAM HOSKING, Author of "Architecture."

BUNYAN. By the Right Hon. THOMAS BABINGTON MACAULAY.

BURMAH. By D. BUCHANAN and E. THORNTON.

ENCYCLOPÆDIA BRITANNICA.—PRINCIPAL SUBJECTS.

VOLUME VI.

BISHOP BUTLER. By Henry Rogers, Author of the "Eclipse of Faith," &c.

BURNING-GLASSES. By George Buchanan, F.R.S.E.

CALENDAR. By Thomas Galloway, F.R.S.

CALIFORNIA.

CALVIN and CHANNING. By Rev. W. L. Alexander, D.D.

CAMPBELL, THOMAS. By W. E. Aytoun, Professor of Rhetoric and Belles Lettres in the University of Edinburgh.

CANADA. By J. B. Brown, Author of "Views of Canada."

CANARY ISLANDS. By J. Y. Johnson, Madeira.

CANNON. By Colonel Portlock, Woolwich.

CAPILLARY ACTION. By James Ivory, F.R.S.

CARTHAGE. By James Browne, LL.D., and Dr Schmitz.

CARPENTRY and CHROMATICS. By Thomas Young, M.D.

CAVAN and CLARE. By Henry Senior.

CENTRE. By John Robison, late Professor of Natural Philosophy in the University of Edinburgh.

CEYLON. By J. Capper, Ceylonese Commissioner to the Great Exhibition of 1851.

CHALMERS, (THOMAS.) By Rev. William Hanna, LL.D.

CHEMISTRY. By William Gregory, Professor of Chemistry in the University of Edinburgh.

CHESS. By James Donaldson.

CHILI. By C. B. Black.

CHINA. By Sir John Barrow.

CHIVALRY. By Sir Walter Scott, Bart.

CHLOROFORM. By J. Y. Simpson, M.D., Professor of Midwifery in the University of Edinburgh.

CHRONOLOGY.

CIVIL LAW. By David Irving, LL.D.

CLIMATE. By Sir John Leslie.

VOLUME VII.

CLOCK AND WATCH WORK. By Edmund Beckett Denison, M.A., Q.C.

COHESION. By Thomas Young, M.D., F.R.S.

COINAGE. By Robert Mushet of the Royal Mint.

COLD and DEW. By Sir John Leslie, late Professor of Natural Philosophy in the University of Edinburgh.

COLLISION, COMBINATION, CORN-LAWS, CORN-TRADE, and COTTAGE SYSTEM. By J. R. M'Culloch.

COLLIERY. By William Alexander, Mining Engineer.

COLONY. By James Mill.

COLOUR-BLINDNESS. By George Wilson, M.D., F.R.S.E.

COMET. By Thomas Galloway, F.R.S.

COMMUNISM and CORPORATION. By J. H. Burton.

CONIC SECTIONS. By William Wallace, LL.D., late Professor of Mathematics in the University of Edinburgh.

CONSTRUCTION. By William Hosking, Author of "Architecture."

CONSTANTINOPLE. By Edward Sang, late Professor of Mechanical Philosophy in the Imperial School, Constantinople.

COPPER SMELTING. By James Napier, Glasgow.

CORK. By Henry Senior.

COTTON MANUFACTURE. Revised by Thomas Bazley, Chairman of the Chamber of Commerce, Manchester.

COWPER. By A. Smith, Author of "A Life Drama," &c.

CRIMEA. By James Laurie.

CRUSADES, CUVIER, DANTON, and DEFOE. By James Browne, LL.D.

CRUSTACEA. By John Fleming, D.D., Professor of Natural Science, New College, Edinburgh.

CUNNINGHAM, DALRYMPLE, and DEMPSTER. By David Irving, LL.D.

DAIRY. By John Wilson, Author of "Agriculture."

DEAF and DUMB. By P. M. Roget, M.D., F.R.S.

DEMOSTHENES. By William Spalding, M.A., Professor of Logic and Metaphysics in the University of St Andrews.

DENMARK. By Emeric Szabad, Author of the Article "Austria."

DIALLING. By Henry Meikle, C.E.

Commerce—Constantinopolitan History—Copyright—Crystallization—Deluge.

VOLUME VIII.

DIPLOMACY and ENTAIL. By JOHN HILL BURTON.

DISTILLATION. By JAMES STARK, M.D., F.R.S.E.

DIVING and DIVING BELL. By GEORGE BUCHANAN, F.R.S.E.

DOCK and DOCK-YARD. By Sir JOHN BARROW, Bart. Revised by his Son, JOHN BARROW, Admiralty.

DOLLOND, DOLOMIEU, and DUHAMEL. By THOMAS YOUNG, M.D, F.R.S.

DONEGAL, DOWN, and DUBLIN. By HENRY SENIOR.

DRAINAGE of TOWNS. By W. HOSKING, Author of "Architecture," &c.

DRAINAGE of LANDS. By J. WILSON, Author of "Agriculture," &c.

DRAMA. By Sir WALTER SCOTT, Bart.

DRAWING and ENGRAVING. By W. H. LIZARS.

DRY ROT. By Sir JOHN BARROW, Bart.

DUMONT, LORD DUNCAN, &c. By JAMES BROWNE, LL.D.

DUNBAR, (WILLIAM,) and ENGLISH LANGUAGE. By DAVID IRVING, LL.D.

DYEING (Calico-Printing.) By F. CRACE CALVERT, Professor of Chemstry, Royal Institution, Manchester.

DYNAMICS. By JOHN ROBISON, late Professor of Natural Philosophy in the University of Edinburgh.

ECONOMISTS. By JAMES MILL.

EDINBURGH and EDINBURGHSHIRE.

EGYPT. By R. STUART POOLE, of the Department of Antiquities, British Museum.

ELECTRICITY. By Sir DAVID BREWSTER, K.H., M.A., D.C.L, &c.

EMBANKMENT. By J. C. LOUDON.

EMIGRATION. By J. R. M'CULLOCH, Author of "Commercial Dictionary," &c.

ENGLAND. By JAMES BROWNE, LL.D., with Continuation.

VOLUME IX.

ENTOMOLOGY, FISHERIES, and EDWARD FORBES. By JAMES WILSON, F.R.S.E.

EPHRAEM SYRUS. By Rev. HENRY BURGESS, LL.D.

EPISCOPACY. By Rev. GEORGE GLEIG, D.D.

ERASMUS and FEUDAL LAW. By DAVID IRVING, LL.D.

EQUATIONS. By JAMES IVORY, F.R.S.

ETHNOLOGY. By R. G. LATHAM, M.A., M.D.

ETRUSCANS, EUGENE, FENELON, &c. By JAMES BROWNE, LL.D.

EUROPE. By CHARLES MACLAREN, F.R.S.E. and JAMES LAURIE.

EVIL. By Rev. W. L. ALEXANDER, D.D.

EXAMINATIONS. By J. F. MACLENNAN.

EXCHANGE, EXCHEQUER BILLS, and EXCISE. By J. R. M'CULLOCH.

EXTREME UNCTION, FATHERS, FEDERAL GOVERNMENT, &c. By Rev. J. TAYLOR, D.D.

FABLE and FALLACY. By WILLIAM SPALDING, A.M., Professor of Logic in the University of St Andrews.

FALCONER, FARQUHAR, and FAIRFAX. By ROBERT CARRUTHERS.

FASHION. By Dr DORAN, Author of "Habits and Men," &c.

FERMANAGH. By HENRY SENIOR.

FEZZAN. Revised by AUGUSTUS PETERMANN.

FICHTE. By JOHN COLQUHOUN, F.R.S.E.

FIFESHIRE and FORTH. By THOMAS BARCLAY.

FIGURE of the EARTH. By THOMAS GALLOWAY, F.R.S.

FILTER. By GEORGE BUCHANAN, F.R.S.E.

FLINTSHIRE. By JOHN GIRDWOOD.

FLORIDA. By J. SMITH HOMANS, New York.

FLUXIONS. By WILLIAM WALLACE, LL.D.

FONTANA, FOSTER, and FOURCROY. By THOMAS YOUNG, M.D.

FOOD. By THOMAS LINDLEY KEMP, M.D.

FORFAR. By JAMES COWIE.

FORTIFICATION. By Colonel PORTLOCK, Woolwich.

FOSTER. By J. E. RYLAND, M.A.

FOX, C. J. By JOHN ALLEN.

Exhibition—Fanaticism.

GALWAY. By Henry Senior.

GANGES. By Edward Thornton, India House.

GASSENDI and GIBBON. By Henry Rogers, Author of the "Eclipse of Faith," &c.

GEOGRAPHY. By Rev. John Wallace, D.D.

GEOMETRY. By William Wallace, LL.D.

GEOMETRY, ANALYTICAL. By Rev. P. Kelland, M.A., Professor of Mathematics in the University of Edinburgh.

GERMANY. By W. Jacob. Revised by James Laurie.

GLACIER and FRESNEL. By J. D. Forbes, Professor of Natural Philosophy in the University of Edinburgh.

GLASGOW. By John Strang, LL.D.

GLASS. By James Ballantyne.

GNOSTICISM. By John Tulloch, D.D., Primarius Professor of Divinity, St Andrews.

GOETHE. By Thomas de Quincey.

GOLDSMITH. By the Right Hon. T. B. Macaulay.

CAPE of GOOD HOPE. By B. C. Pine, late Lieutenant-Governor of Natal.

GOTAMA BUDDHA. By Rev. R. Spence Hardy, Hon. M.R.A.S., Author of "Eastern Monachism," &c.

GOTHS. By Leonard Schmitz, LL.D.

GOVERNMENT. By P. E. Dove, Author of the "History of Human Progression," &c.

GRAMMAR. By Bishop Gleig. Revised by W. Spalding, Professor of Logic in the University of St Andrews.

VOLUME XI.

GRAY, HERRICK, and **HOGG**. By Robert Carruthers.

GREECE. By Charles Maclaren, F.R.S.E. Revised.

GREEK CHURCH. By W. M. Hetherington, D.D., LL.D.

GREGORY of **NAZIANZUM**. By John Tulloch, D.D.

GREGORY (Dr. **JAMES**). By W. P. Alison, M.D.

GUINEA and **HOUSSA**. By Augustus Petermann, F.R.G.S., &c.

GUN-COTTON, GUNPOWDER, GUTTA PERCHA, and **HAT-MAKING**. By Charles Tomlinson.

GUNMAKING. By P. E. Dove.

GUNNERY. By Colonel Portlock.

HALL (ROBERT). By Henry Rogers.

HARBOURS. By Thomas Stevenson, C.E.

HARE (C. J.) By W. L. Alexander, D.D.

HARVEY. By Thomas Laycock, M.D., Professor of the Practice of Physic in the University of Edinburgh.

HEAT. By T. S. Traill, M.D., Professor of Medical Jurisprudence in the University of Edinburgh.

HELMINTHOLOGY. By James Wilson, F.R.S.E.

HEMP. By T. C. Archer, Author of "Popular Economic Botany," &c.

HERALDRY. By T. W. King, York Herald, Herald's College.

HEYNE. By Sir William Hamilton, Bart.

HIEROGLYPHICS. By R. S. Poole, M.R.S.L., &c.

HIMALAYA MOUNTAINS. By Joseph D. Hooker, M.D., F.R.S.

HINDUSTAN. Revised by Edward Thornton, India House.

HISTORY. By David Masson, M.A., Professor of English Literature, University College.

HOLLAND. Revised by the Rev. James Ingram, M.A.

HOMER. By John S. Blackie, Professor of Greek in the University of Edinburgh.

HOMŒOPATHY. By W. T. Gairdner, M. D.

HOOD (THOMAS). By Richard Monckton Milnes.

HORACE. By Theodore Martin.

HORSE, HORSEMANSHIP, and **HOUND**. Revised by W. H. Langley, Editor of "Bell's Life in London."

HORTICULTURE. By Charles Macintosh, Author of the "Book of the Garden."

HOWARD (JOHN). By Hepworth Dixon.

HOUSEHOLD (ROYAL). By Samuel Redgrave.

VOLUME XII.

HUME (DAVID). By HENRY ROGERS, Esq., Author of the "Eclipse of Faith," &c.

HUNGARY. By EMERIC SZABAD, late Secretary under the Hungarian National Government of 1849.

HUNTER (JOHN and WILLIAM), and JENNER. By THOMAS LAYCOCK, M.D., Professor of the Practice of Medicine in the University of Edinburgh.

HUNTING. By NIMROD. Revised by W. H. LANGLEY, Esq., Editor of "Bell's Life in London."

HYDRODYNAMICS. By SIR DAVID BREWSTER, K.H., LL.D.

HYPATIA, and IAMBLICHUS. By the Rev. CHARLES KINGSLEY, Author of "Westward Ho," &c.

ICELAND. By ROBERT ALLAN, Esq. Revised by ROBERT CHAMBERS, Esq.

ICHTHYOLOGY. By Sir JOHN RICHARDSON, K.B., &c.

ICHTHYOLOGY (FOSSIL). By T. S. TRAILL, M.D., Professor of Medical Jurisprudence in the University of Edinburgh.

INSURANCE (LIFE). By W. T. THOMSON, Esq., Manager of the Standard Life Assurance Company.

INSURANCE (FIRE). By F. G. SMITH, Esq., Secretary of the Scottish Union Fire and Life Insurance Company.

INSURANCE (MARINE). By JOHN WARRACK, Esq.

INTEREST. By J. R. M'CULLOCH, Esq.

IONIAN ISLANDS. By WILLIAM BLAIR, Esq., late Member of the Supreme Council of Justice of the Ionian Islands, and Author of "Inquiry into Slavery amongst the Romans."

IRELAND (HISTORY). By Rev. E. GROVES. (STATISTICS) by HENRY SENIOR, Esq.

IRON. By WILLIAM FAIRBAIRN, Esq., F.R.S., F.G.S., &c.

IRON BRIDGES. By ROBERT STEPHENSON, Esq., M.P., President of the Institution of Civil Engineers.

IRRIGATION. By JAMES CAIRD, Esq., Author of "English Agriculture in 1850-51."

ITALY. By * * *

JAMAICA. Ry STEPHEN CAVE, Esq.

JAPAN AND JAVA. By JOHN CRAWFURD, Esq. F.R.S., Author of "A Descriptive Dictionary of the Indian Islands."

JESUITISM. By ISAAC TAYLOR, Esq., Author of the "Natural History of Enthusiasm," &c.

JESUS AND JEWS. By the Rev. DAVID WELSH, D.D., late Professor of Ecclesiastical History in the University of Edinburgh. Revised.

JOHNSON (SAMUEL). By the Right Hon. THOMAS BABINGTON MACAULAY.

JOINERY. By THOMAS TREDGOLD, Esq., C.E. Revised by ARTHUR ASPHITEL, Esq.

VOLUME XIII.

KAFRARIA. By Sir BENJAMIN PINE.

KANT. By the Rev. JOHN CAIRNS, M.A.

KARS. Revised by Dr. SANDWITH, K.B.

KNIGHTS, KNIGHTHOOD, LIVERY, and **LORRAINE.** By Dr. DORAN.

LABRADOR and **LAPLAND.** Revised by AUGUSTUS PETERMANN, F.R.G.S., &c.

LAGRANGE and **LALANDE.** By THOMAS YOUNG, M D.

LANGUAGE. Revised by R. G. LATHAM., M.A., M.D., &c.

LAW. By J. F. M'LENNAN, M.A., Advocate.

LAW OF NATIONS and **LIBERTY OF THE PRESS.** By JAMES MILL.

LEAD, LEATHER, and **LIFE PRESERVERS.** By CHARLES TOMLINSON.

LEPROSY. By J. Y. SIMPSON, M.D., Professor of Midwifery in the University of Edinburgh.

LIBRARIES. By EDWARD EDWARDS, Free Library, Manchester.

LIGHT. By T. S. TRAILL, M.D., Professor of Medical Jurisprudence in the University of Edinburgh.

LIGHTHOUSES. By ALAN STEVENSON, C.E.

LOCK. By E. B. DENISON, M.A., Q.C.

LOGIC. By WILLIAM SPALDING, M.A., Professor of Logic and Metaphysics in the University of St. Andrews.

LOMBARDS and **LOMBARDY.** By the Author of the Article "ITALY."

LONDON. By H. G. REID.

LUTHER. By C. C. J. BUNSEN, D.D., D.C.L., D. Ph., &c.

MADAGASCAR. By the Rev. W: ELLIS, Author of "Polynesian Researches," &c.

MADEIRA. By J. Y. JOHNSON, Author of a "Handbook for Madeira."

VOLUME XIV.

MAGNETISM. By Sir DAVID BREWSTER, K.H., &c.

MAMMALIA. By JAMES WILSON, Author of the article "Entomology."

MANCHESTER. By THOMAS BAZLEY, Chairman of the Chamber of Commerce, Manchester.

MANUFACTURES. By J. R. M'CULLOCH.

MECHANICS. By W. J. M. RANKINE, Professor of Civil Engineering and Mechanics in the University of Glasgow.

MEDICAL JURISPRUDENCE. By T. S. TRAILL, M. D., Professor of Medical Jurisprudence in the University of Edinburgh.

MEDICINE. By THOMAS LAYCOCK, M.D., Professor of the Practice of Physic in the University of Edinburgh.

MELBOURNE. By WILLIAM WESTGARTH, Author of the "Gold Fields of Australia," etc.

MEMNON AND MEMPHIS. By R. S. POOLE, Author of the article "Egypt."

MENSURATION. By WILLIAM SWAN, Lecturer on Mathematics and Natural Philosophy.

MENTAL DISEASES. By DAVID SKAE, M.D., Physician to the Royal Edinburgh Asylum.

METAPHYSICS. By Rev. H. L. MANSEL, Reader in Moral and Metaphysical Philosophy, Magdalen College, Oxford, and one of the Editors of Sir William Hamilton's Works.

METEOROLOGY. By Sir JOHN F W. HERSCHEL, Bart., K.H., M.A., D.C.L., etc.

MEXICO.

MICROMETER. By Sir DAVID BREWSTER, K. H., etc.

MICROSCOPE. By Sir DAVID BREWSTER, K. H., etc.

VOLUME XV.

MILAN, MODENA, AND NAPLES. By the Author of the article "Italy."

MILTON. By David Masson, M.A., Professor of English Literature, University College, London.

MINERAL WATERS. By R. M. Glover, M.D., Author of "The Mineral Waters of Great Britain and the Continent."

MINERALOGICAL SCIENCE.

MINERALOGY. By James Nicol, Professor of Natural History, Marischal College, Aberdeen.

GEOLOGY. By J. B. Jukes, Vice President of the Geological Society of Dublin.

MINES AND MINING. By J. R. Leifchild, Author of "Our Coal Fields and our Coal Pits."

MIRACLES. By Rev. James Taylor, D.D.

MISSIONS. By William Brown, M.D.

MISSISSIPPI, MISSOURI, AND MOBILE. By J. B. D. De Bow, Author of the "Industrial Resources, etc., of the South and West."

MOBILIER, CREDIT. By Walter Bagehot.

MOHAMMEDANISM. By Rev. J. G. Cazenove.

MOLLUSCA. By Richard Owen, F.R.S.

MONARCHY. By Dr. Doran.

MONEY. By J. R. M'Culloch.

MONTREAL. By Hon. John Young.

MOORE (THOMAS). By R. Carruthers.

MORAL PHILOSOPHY. By W. L. Alexander, D.D.

MOSQUITO SHORE. By E. S. Squier, Author of "Notes on Central America."

MOZART AND MUSIC. By G. F. Graham.

MUNICIPAL CORPORATIONS. By J. H. Burton.

NATAL. By Sir Benjamin Pine.

NATIONAL EDUCATION. By J. D. Morell, one of H. M. Inspectors for Schools.

RELIGIOUS WORKS.

I.

In Two Volumes, medium 8vo, price £3, with a complete Index,
and upwards of 554 Illustrations,
A NEW EDITION,
EDITED by the REV. HENRY BURGESS, LL.D., Ph.D.,
OF

KITTO'S CYCLOPÆDIA
OF
BIBLICAL LITERATURE.

Compiled by the late JOHN KITTO, D.D.,
With the Assistance of numerous able Scholars and Divines, British, Continental, and American, whose Initials are affixed to their respective Contributions.

The following branches of Knowledge are comprised in the Work:—

1. **BIBLICAL CRITICISM**—Embracing the History of the Bible Languages—the Canon of Scripture—Literary History and Peculiarities of the Sacred Books—Formation and History of the Texts of Scripture.
2. **BIBLICAL INTERPRETATION**—Comprehending the Principles of Translating and Expounding Scripture—Critical Estimate of the leading Interpreters and principal Versions, Ancient and Modern.
3. **HISTORY**—Proper Names of Persons—Biographical Sketches of the more prominent Characters—Detailed Accounts of the Principal Events recorded in Scripture—Chronology and Genealogy of Scripture.
4. **GEOGRAPHY**—Names of Places—Description of Scenery—Boundaries and Mutual Relations of the Countries mentioned in Scripture, so far as necessary to illustrate the Sacred Text.
5. **ARCHÆOLOGY**—Manners and Customs of the Jews, and other Nations mentioned in Scripture—their Sacred Institutions—their Military Affairs—their Political Arrangements—their Literary and Scientific Pursuits.
6. **PHYSICAL SCIENCE**—Scripture Cosmogony and Astronomy—Zoology—Mineralogy—Botany—Meteorology.

LIST OF SOME OF THE CONTRIBUTORS.

◆

Rev. W. L. Alexander, D.D.

Rev. G. Baur, Ph.D. of the University of Giessen.

Rev. J. R. Beard, D.D., Member of the Historico-Theological Society of Leipzig.

G. M. Bell, Author of "Universal Mechanism," &c.

Rev. C. H. F. Bialloblotzky, Ph.D., Göttingen.

Rev. John Brown, D.D., Professor of Exegetical Theology to the United Secession Church.

Rev. George Bush, Professor of Hebrew and Oriental Literature in the University of New York.

Rev. James D. Butler, Abbot Resident, Theological Seminary, Andover, United States.

K. A. Credner, Doctor and Professor of Theology in the University of Giessen.

Rev. S. Davidson, LL.D., Professor of Biblical Literature and Oriental Languages in the Independent College, Manchester.

Rev. Benjamin Davies, D.D.

Rev. J. F Denham, M.A., St. John's College, Cambridge, F.R.S.

Rev. J. W. Doran, LL.D., Association Secretary of the Church Missionary Society.

Rev. John Eadie, LL.D., Professor of Biblical Literature to the United Secession Church.

G. H. A. Von Ewald, Doctor and Professor of Theology in the University of Tübingen.

Rev. F. W. Gotch, M.A., Trinity College, Dublin.

H. A. C. Havernick, Doctor and Professor of Theology in the University of Königsberg.

LIST OF CONTRIBUTORS—*Continued.*

E. W. HENGSTENBERG, Doctor and Professor of Theology in the University of Berlin.

Rev. J. JACOBI, of the University of Berlin.

Rev. R. JAMIESON, M.A.

Rev. E. A. LAWRENCE, Haverhill, United States.

Rev. ROBERT LEE, D.D., Professor of Biblical Criticism in the University of Edinburgh.

FREDERICK R. LEES, Ph.D., F.S.S.A., Editor of "The Truth-Seeker," &c.

E. MICHELSON, Ph.D. of the University of Heidelberg.

PETER MEARNS, Author of "Tirosh," &c.

Rev. N. MORREN, M.A.

F. W. NEWMAN, late Fellow of Balliol College, Oxford.

JOHN NICHOLSON, B.A., Oxford, Ph.D., Tubingen.

W. A. NICHOLSON, M.D.

Rev. JOHN PHILIPS POTTER, M.A., Oriel College, Oxford.

Rev. BADEN POWELL, M.A., F.R.S., F.G.S., Savilian Professor of Geometry in the University of Oxford.

J. F. BOYLE, M.D., F.R.S., F.L.S., F.G.S., Professor of Materia Medica and Therapeutics in King's College, London.

J. E. RYLAND, Translator of "Neander's Church History."

Lieut.-Colonel C. HAMILTON SMITH, K.H. and K.W., F.R. and L.S.

Rev. J. PYE SMITH, D.D., F.R.S., F.G.S.

Rev. H. STEBBING, D.D. of St. John's College, Cambridge.

Rev. A. THOLUCK, Doctor and Professor of Theology in the University of Halle.

Rev. DAVID WELSH, D.D.

Rev. LEONARD WOODS, D.D., Professor of Theology in the Andover Theological Seminary, United States.

Rev. WILLIAM WRIGHT, M.A. and LL.D. of Trinity College, Dublin.

Religious Works—*Continued.*

II.

A TREATISE ON BIBLICAL CRITICISM. Exhibiting a Systematic View of that Science. By Samuel Davidson, D.D., Author of "Ecclesiastical Polity," &c. New Edition. In One Volume 8vo, price 18s.

III.

A POPULAR DICTIONARY OF THE BIBLE. By John Kitto, D.D., Author of the "Cyclopædia of Biblical Literature," &c. In One Volume 8vo, illustrated by 336 Engravings on Wood, price 10s. 6d.

IV.

DR. WARDLAW'S LIFE AND CORRESPONDENCE. By W. L. Alexander, D.D. Second Edition. In One Volume, demy 8vo, price 12s.

V.

RALPH WARDLAW'S SYSTEMATIC THEOLOGY. Edited by the Rev. J. R. Campbell, M.A. Three vols. demy 8vo, price 12s. each.

VI.

BERRIDGE'S CHRISTIAN WORLD UNMASKED. New Edition. Edited, and with a Life of the Author. By Thomas Guthrie, D.D. Foolscap 8vo, price 2s. 6d.

VII.

THE HISTORY OF PALESTINE: From the Patriarchal Age to the present time. By John Kitto, D.D., Author of Popular Dictionary of the Bible, &c. Profusely Illustrated. Crown 8vo, cloth plain, 6s.; or cloth, gilt edges, 6s. 6d.

VIII.

THE CITY; ITS SINS AND SORROWS. Being a Series of Sermons from Luke xix. 41. By Thomas Guthrie, D.D. Fifteenth Thousand. Crown 8vo, price 3s.

IX.

THE RELIGION OF THE HEART, as Exemplified in the Life and Writings of John Bowdler, late of Lincoln's Inn, Barrister-at-Law. Edited by Charles Bowdler. Fcp. 8vo, price 5s.

RELIGIOUS WORKS—*Continued.*

X.

The TWENTIETH THOUSAND, Price 7s. 6d.,

OF

THE GOSPEL IN EZEKIEL;

A SERIES OF DISCOURSES,

BY THOMAS GUTHRIE, D.D.

Author of "Pleas for Ragged Schools."

OPINIONS OF THE PRESS:

"Dr. Guthrie stands among the foremost preachers of the present day. His sermons unite a strain of lofty thought and burning sentiment with a boundless power of illustration, and a gorgeous imagination. Sound in doctrine, and endowed with a fervent jealousy for the honour of God and the integrity of His Word, he grapples boldly and successfully with the plausible arguments of modern infidelity, and vindicates with no common power the faithfulness, wisdom, and immeasurable love of God in the great scheme of saving grace. In the present volume the topics are taken from the thirty-sixth chapter of Ezekiel, from which the author has gathered materials for twenty-two sermons, the subjects of which range from the ruin of man to the blessedness of the saints and the security of the believer, through all the intermediate topics that lie between."—*The Record.*

"The volume will earn attention for its sacred themes, wherever taste for pictorial writing exists, which our current literature has created; and it is destined, we believe, by reason of its more enduring merits, to pass into the hands of our children's children, as one of the manuals of piety by which, in future generations, the faith of our Scottish people will be brightened and refreshed."—*North British Review.*

"To our friends south of the Scottish Border who do not know Dr. Guthrie, we say, Procure this volume and read it, and you will feel that you have made the acquaintance of a man whom it were worth while to go some distance to see."—*British Quarterly Review.*

MEDICAL AND SURGICAL WORKS.

I.

ADDRESSES TO MEDICAL STUDENTS: Delivered at the instance of the Edinburgh Medical Missionary Society, 1855-6. By W. P. Alison, M.D., Emeritus Professor of the Practice of Physic in the University of Edinburgh; George Wilson, M.D., Professor of Technology in the University of Edinburgh; Andrew Wood, M.D., President of the Royal College of Surgeons of Edinburgh; Benjamin Bell, F.R.C.S.E.; and John Coldstream, M.D. Fcap. 8vo. 3s. 6d.

II.

By Sir George Ballingall,
Late Professor of Military Surgery in the University of Edinburgh,

OUTLINES OF MILITARY SURGERY. Fifth Edition, illustrated. 8vo. 16s.

III.

By John Hughes Bennett, M.D., F.R.S.E.,
Professor of the Institutes of Medicine, and of Clinical Medicine, in the University of Edinburgh,

AN INTRODUCTION TO CLINICAL MEDICINE. Six Lectures on the Method of Examining Patients, and the Means Necessary for Arriving at an Exact Diagnosis. Third Edition, with numerous illustrations. 12mo. 5s.

IV.

By the same Author,

CLINICAL LECTURES ON THE PRINCIPLES AND PRACTICE OF MEDICINE. Demy 8vo. Illustrated.

V.

By Robert Christison, M.D.,
Professor of Materia Medica in the University of Edinburgh,

A TREATISE ON POISONS. In relation to Medical Jurisprudence, Physiology, and the Practice of Physic. Fourth Edition, enlarged and improved. 8vo. 10s.

MEDICAL AND SURGICAL WORKS—*Continued.*

VI.

By WILLIAM GREGORY,

Professor of Chemistry in the University of Edinburgh,

ELEMENTARY TREATISE ON CHEMISTRY. Illustrated. Fcap. 8vo. 5s.

"This work will form a valuable text-book to instruct those commencing the study of the science, and to systematize the knowledge of those who have made some progress in it, if not also to suggest new ideas to the advanced student."—*Aberdeen Journal.*

VII.

By THOMAS LAYCOCK, M.D., F.R.S.E., F.R.C.P.,

Professor of the Practice of Medicine, and of Clinical Medicine, in the University of Edinburgh, &c. &c.

MEDICAL OBSERVATION AND RESEARCH.

"We hail this work in the light of a great step towards a consistent and complete philosophy of Medicine."—*Journal of Psychological Medicine.*

"Dr Laycock's work is calculated to advance the science of medicine in these kingdoms, and to elevate its professors in public estimation. Every page gives evidence of a thoughtful mind, well stored in the theory of medicine, and, at the sametime, fully prepared to make the best use of all practical medical resources."—*Medical Times and Gazette.*

"We can honestly recommend the study of it, not only to the junior members of the profession, but also to that section of the public which takes an interest in the progress of medical science; as eminently calculated both to instruct and to suggest, to warn its readers against wrong paths, and to open out new and promising routes to the searcher after truth."—*Westminster Review.*

"A work which should, without delay, become the object of their most diligent perusal and study."—*The Veterinarian.*

VIII.

By JAMES MILLER, F.R.S.E.,

Professor of Surgery in the University of Edinburgh, &c. &c.

THE PRINCIPLES OF SURGERY. Third Edition, illustrated by 240 Wood Engravings. 16s. cloth.

"An admirable epitome of the surgical science of the day. Being written by a sound practical surgeon, accustomed to the public teaching of his science, it has that clearness of diction and arrangement which renders it an excellent manual for the student, as well as that amount of scientific and practical information which makes it a safe and valuable guide to the practitioner."—*Lancet.*

MEDICAL AND SURGICAL WORKS—*Continued.*

IX.

By the same Author,

THE PRACTICE OF SURGERY. New Edition, illustrated by 227 Wood Engravings. 16s. cloth.

> "We have no hesitation in stating, that the two volumes form together a more complete text-book of surgery than any one that has been heretofore offered to the student."—*Northern Journal of Medicine.*

X.

By ALEXANDER MACAULAY, M.D.,

A DICTIONARY OF MEDICINE, designed for Popular Use. Containing an Account of Diseases and their Treatment, including those more frequent in Warm Climates, with directions for administering the various substances used as Medicines, the Regulation of Regimen and Diet, and the management of the Diseases of Women and Children. Thirteenth Edition. 8vo. 12s.

XI.

By JAMES Y. SIMPSON, M.D., F.R.S.E.,

Professor of Medicine and Midwifery in the University of Edinburgh.

OBSTETRIC MEMOIRS AND CONTRIBUTIONS, including those on Anæsthesia. Edited by W. C. PRIESTLEY, M.D., and H. R. STORER, M.D. 2 vols. 8vo. Profusely Illustrated. 36s.

> "Will be received as a valuable boon by the profession, and consulted by all who are interested in the progress and advancement of Obstetric science."—*Brit. and Foreign Med. Chirurg. Review.*

XII.

By T. S. TRAILL, M.D.,

Professor of Medical Jurisprudence in the University of Edinburgh.

MEDICAL JURISPRUDENCE, being Outlines of a Course of Lectures. Third Edition. Fcap. 8vo. 5s.

XIII.

By CHARLES WILSON, M.D.,

THE PATHOLOGY OF DRUNKENNESS. A View of the Operation of Ardent Spirits in the Production of Disease, founded on Original Observation and Research. Fcap. 8vo. 3s.

ATLASES.

I.

GENERAL ATLAS OF THE WORLD. Containing upwards of Seventy Maps, engraved on Steel, in the first style of the Art, by HUGHES, BARTHOLOMEW, and others; with Introductory Chapters on the Geography and Statistics of the different Countries in the World, and an Index of all the Names occurring in the several Maps, amounting to 60,000, with their Latitude and Longitude, and the number of the Map in which they will be found. New Edition, with numerous improvements and additions, strongly and elegantly half-bound in morocco, with gilt leaves. £2 : 16s.

> "Large enough to be distinct, without being so large as to be unwieldly; it has all that any one can require for general use, and all that could be introduced, without making it too bulky or too expensive."—*Church of England Quarterly Review.*

II.

ATLAS OF NORTH AMERICA, with Maps of the various Provinces, States, and Countries of that Continent, and Plans of the City of New York, the Environs of Montreal, and Panama Railway. Constructed from the most recent authorities. By JOHN BARTHOLOMEW, F.R.G.S.

PRINCIPAL CONTENTS.

No. I. NORTH AMERICA. II. BRITISH, RUSSIAN, AND DANISH AMERICA—POLAR REGIONS. III. UPPER CANADA. IV. LOWER CANADA, NEW BRUNSWICK. V. to XVIII. SEPARATE STATES AND TERRITORIES OF THE UNITED STATES. XIX. MEXICO, CENTRAL AMERICA, AND WEST INDIES. XX. STEAMER ROUTES AND OCEANIC CURRENTS. With descriptive Letterpress, and an Index of 21,000 Names. Imperial Folio. 16s.

> "*The peculiar value of this Atlas lies in its minuteness of detail. Every county, road, and river is given for every State throughout the Union and in Canada as minutely, and we believe as accurately, as if the subject were our own island. All the newest discoveries and changes too are here embodied.*"—Economist.

> "*An Atlas of North America as complete as any Englishman can need.*"—Examiner.

ATLASES—*Continued.*

III.

HAND-ATLAS OF MODERN GEOGRAPHY. A Series of Thirty-Eight Maps. By WILLIAM HUGHES, F.R.G.S.; and JOHN BARTHOLOMEW. With a Complete Index of Names. Quarto, half-bound, 21s.

IV.

SCHOOL ATLAS OF MODERN GEOGRAPHY. New Edition. A Series of Thirty-Seven Maps, for Instruction in Physical, Ancient, and Scripture Geography. With Index. 4to or 8vo, Cloth, 10s. 6d.

"In comprehensiveness, accuracy, finished execution, judicious adaptation to educational purposes, and moderateness of price, this Atlas stands quite alone."—*Athenæum.*

"This is, without exception, one of the best Atlases we ever saw. We commend this Atlas strongly."—*English Journal of Education.*

V.

SCHOOL ATLAS FOR BEGINNERS. New Edition. A Series of Twenty-Seven Maps of the Principal Countries in the World. Oblong 12mo or 18mo, 2s. 6d.

"Deserves a wide circulation. The Maps by Mr. Bartholomew are admirably executed. Compared with other Atlases of the same size and price which we have seen, this has decidedly the advantage."—*Athenæum.*

VI.

ATLAS OF AUSTRALIA, with all the GOLD REGIONS. A Series of Maps from the latest and best authorities. *Contents:*—I. GENERAL MAP OF AUSTRALASIA, New Zealand, Polynesia, and Surrounding Islands. II. AUSTRALIA — Divided into Districts. III. NEW SOUTH WALES, VICTORIA, and SOUTH AUSTRALIA, showing the Different Gold Deposits. IV. NEW SOUTH WALES—Divided into counties, with all the Gold Deposits accurately laid down, and a plan of Sydney. V. VICTORIA—Divided into Counties, with all the Gold Districts accurately laid down, and a plan of the Mount Alexander Gold Region. VI. NEW ZEALAND, VAN DIEMEN'S LAND, and the settled portion of Western Australia, comprehending Swan River and Australind. Quarto, cloth, 6s.

EDUCATIONAL WORKS.

CLASS-BOOK OF ENGLISH POETRY. Comprising Extracts from the most distinguished Poets of the Country. By Daniel Scrymgeour. Fifth Edition. 12mo, price 4s. 6d. Also, to be had in Two Parts at 2s. 6d. each. Part I.—Containing the Poets from Chaucer to Otway. Part II.—From Prior to Tennyson.

ELEMENTARY GRAMMAR OF THE GREEK LANGUAGE. By Dr. L. Schmitz, Rector of the High School of Edinburgh. 12mo, price 3s. 6d.

FIRST STEPS IN THE PHYSICAL AND CLASSICAL GEOGRAPHY OF THE ANCIENT WORLD. By James Pillans, Professor of Humanity in the University of Edinburgh. Third Edition. 12mo, price 1s. 6d.

COLLECTION FOR SCHOOLS, from the Works of Sir WALTER SCOTT. Seventh Edition. Roan, price 3s. 6d.

"An invaluable book, exciting in the young a desire to read."—*Glasgow Herald.*

SCOTLAND. By Sir Walter Scott, Bart. From the Earliest Period to the Close of the Rebellion, 1745-46. Twentieth Edition. 2 vols., bound, price 10s.

SCOTLAND. By P. F. Tytler, Esq. Enlarged and Continued to the Present Time, by the Rev. James Taylor, D.D., and adapted to the Purposes of Tuition by Alex. Reid, LL.D. Sixth Edition. 12mo, price 3s. 6d.

FRANCE. By Sir Walter Scott, Bart. New Edition. Illustrated. Fcap. 8vo, price 4s.

PALESTINE. By John Kitto, D.D. From the Patriarchal Age to the Present time; containing Introductory Chapters on the Geography and Natural History of the Country, and on the Customs and Institutions of the Hebrews. Adapted to the purposes of Tuition, by Alexander Reid, LL.D. 12mo, price 3s. 6d.; or with Map of Palestine, 4s.

MODERN HISTORY. By A. F. Tytler, late Professor of Universal History in the University of Edinburgh. Fourth Edition. 12mo, price 3s.

By the same Author,

ANCIENT HISTORY. Fourth Edition. 12mo, price 3s.

SIR WALTER SCOTT'S WORKS.

THE WAVERLEY NOVELS.

LIBRARY EDITION. Illustrated by upwards of Two Hundred Engravings on Steel, after Drawings by Turner, Landseer, Wilkie, Stanfield, Roberts, etc., including Portraits of the historical Personages described in the Novels. Complete in 25 volumes demy octavo, elegantly bound in extra cloth, price £13 : 2 : 6.

ABBOTSFORD EDITION. With One Hundred and Twenty Engravings on Steel, and nearly Two Thousand on Wood. In 12 vols. super royal 8vo, price £14 : 14s.

AUTHOR'S FAVOURITE EDITION. 48 vols. foolscap 8vo. (96 Engravings), price £7 : 4s.

CABINET EDITION. 25 vols. foolscap 8vo, (26 Illustrations), price £3 : 13 : 6.

PEOPLE'S EDITION. 5 vols. royal 8vo, price £2 : 2s.

SEPARATE NOVELS, PEOPLE'S EDITION, in beautifully illuminated covers. Price 1s. 6d. each, as follows :—

1. WAVERLEY.
2. GUY MANNERING.
3. ANTIQUARY.
4. ROB ROY.
5. OLD MORTALITY.
6. THE BLACK DWARF AND LEGEND OF MONTROSE.
7. HEART OF MID-LOTHIAN.
8. BRIDE OF LAMMERMOOR.
9. IVANHOE.
10. MONASTERY.
11. ABBOT.
12. KENILWORTH.
13. PIRATE.
14. FORTUNES OF NIGEL.
15. PEVERIL OF THE PEAK.
16. QUENTIN DURWARD.
17. ST. RONAN'S WELL.
18. REDGAUNTLET.
19. BETROTHED AND HIGHLAND WIDOW.
20. THE TALISMAN.
21. WOODSTOCK.
22. FAIR MAID OF PERTH.
23. ANNE OF GEIERSTEIN.
24. COUNT ROBERT OF PARIS.
25. SURGEON'S DAUGHTER AND CASTLE DANGEROUS.

Separate Novels may also be had from any of the other Editions.

MISCELLANEOUS PROSE WORKS.

CONSISTING OF

TALES OF A GRANDFATHER, (History of Scotland).
TALES OF A GRANDFATHER, (History of France).
LIFE OF JOHN DRYDEN.
MEMOIRS OF JONATHAN SWIFT.
MEMOIRS OF EMINENT NOVELISTS, &c.
PAUL'S LETTERS TO HIS KINSFOLK.
ESSAYS ON CHIVALRY, ROMANCE, AND THE DRAMA, &c.
PROVINCIAL ANTIQUITIES OF SCOTLAND.
LIFE OF NAPOLEON BONAPARTE.
MISCELLANEOUS CRITICISMS, ETC.

COMPLETE EDITIONS.

I. In Twenty-eight volumes Foolscap 8vo, with Fifty-six Engravings from Turner. Price £4 : 4s ; Separate volumes, 3s.

II. In Three Volumes Royal 8vo. (PEOPLE'S EDITION). Bound in cloth, price £1 : 6s. Separate volumes, I. and II., 10s. each. III. (TALES OF A GRANDFATHER), price 6s.

Illustrated Edition of the TALES OF A GRANDFATHER—(HISTORY OF SCOTLAND). With Six Engravings after Turner, and upwards of Fifty on Wood. In Three volumes Foolscap 8vo, cloth, 12s. ; extra cloth, gilt edges, 15s.

(HISTORY OF FRANCE). With Two Engravings from Turner, and upwards of Fifty on Wood. One volume Foolscap 8vo, cloth, 4s. ; extra cloth, gilt edges, 5s.

SCHOOL EDITION of the HISTORY OF SCOTLAND, with Map. In Two volumes, Crown 8vo, bound, 10s.

LIFE OF NAPOLEON BONAPARTE. Five volumes Foolscap 8vo, Maps, Portrait, and Nine Engravings after Turner. Cloth, price £1.

Another Edition in larger type. Nine volumes foolscap 8vo, Maps, Portraits, and Engravings. Cloth, price £1 : 7s.

POETICAL WORKS.

CONSISTING OF

First, The Metrical Romances,—THE LAY OF THE LAST MINSTREL; MARMION; THE LADY OF THE LAKE; ROKEBY; THE LORD OF THE ISLES; THE VISION OF DON RODERICK; THE BRIDAL OF TRIERMAIN; AND HAROLD THE DAUNTLESS.

Second, Dramas, Songs, and Ballads.

Third, The Minstrelsy of the Scottish Border.

The following are the only COPYRIGHT EDITIONS, with the AUTHOR'S LAST NOTES and IMPROVEMENTS:—

I. In One portable foolscap volume, including all the Metrical Romances (except the Bridal of Triermain and Harold), the Principal Songs and Ballads, and several Illustrations. Bound in cloth, gilt edges, price 5s.; or morocco antique, 10s.

II. In One crown octavo volume (same contents as previous edition), with numerous Engravings on Steel and Wood, after J. M. W. Turner and John Gilbert. Bound in cloth, gilt edges, 7s. 6d.; morocco antique, 14s.

III. In Twelve volumes. Fcap. 8vo (24 Engravings), £1:16s.
This is the only edition which contains the Minstrelsy of the Scottish Border.

IV. In Six volumes. Fcap. 8vo (12 Engravings), £1:4s.

V. In One volume. Royal 8vo (PEOPLE'S EDITION), 10s.

VI. The ABBOTSFORD EDITION, printed on Tinted Paper, with upwards of Sixty Illustrations on Steel and Wood, after Turner, Gilbert, and Foster. Elegantly bound in extra cloth, gilt edges, price £1:11:6; morocco, elegant or antique, £2:2s.

VII. TOURISTS' EDITIONS OF THE LAY OF THE LAST MINSTREL, MARMION, LADY OF THE LAKE, LORD OF THE ISLES, ROKEBY, and BRIDAL OF TRIERMAIN, 1s. 3d. each; 1s. 6d. cloth; or 2s. 6d. morocco, gilt edges.

VIII. New Illustrated Editions of THE LADY OF THE LAKE, MARMION, LAY OF THE LAST MINSTREL, and LORD OF THE ISLES, containing each from Seventy to One Hundred Illustrations on Wood, by Birket Foster and John Gilbert. Printed in the best style, on Tinted Paper, and elegantly bound in cloth, gilt edges, price 18s. each; morocco, elegant or antique, £1:5s.; enamelled tartan boards, £1:16s.

SELECTIONS

FROM

SIR WALTER SCOTT'S WORKS.

- Belgium and Waterloo.
- France and Paris.
- Tales of Chivalry.
- Romantic Narratives.
- Characters of Eminent Persons.
- The Highland Clans.
- Scottish Scenes and Characters.
- Narrative and Descriptive Pieces.

Price Eighteenpence, or Two Shillings, Cloth.

BEAUTIES OF SIR WALTER SCOTT, being Selections from his Writings and Life. One volume, Crown Octavo, with Two Engravings. Cloth, gilt, 5s.; extra cloth, gilt sides and edges, 6s.

The same volume bound as a School Book. Price 3s. 6d.

READINGS FOR THE YOUNG, from the Works of Sir Walter Scott. In Three volumes, with Thirty-six Illustrations on Wood, price 2s. 6d. each; or bound in One volume, cloth, gilt edges, 7s.

LIFE OF SIR WALTER SCOTT.

By J. G. LOCKHART, Esq.

Three Editions as follows:—

I.

In Ten volumes Foolscap 8vo, uniform with the Author's Favourite Edition of the Novels. Twenty Engravings on Steel, price £1 : 10s.

II.

In One vol. Royal 8vo, uniform with the Novels, People's Edition. With Portrait, price 10s.

The same, Large Paper, uniform with the Novels, Abbotsford Edition. With Eleven Engravings from Turner, Portraits, &c., price 18s.

III.

In One vol. Crown 8vo, with Twelve Engravings from Turner and others. Price 7s. 6d.; extra cloth, gilt edges, 8s. 6d.

BLACK'S GUIDE BOOKS

FOR

ENGLAND, SCOTLAND, AND IRELAND.

Illustrated by Maps, Charts, numerous Views of the Scenery, full particulars regarding Hotels, Inns, Rates of Charges, Distances, and every information likely to prove Useful or Instructive.

IN PORTABLE VOLUMES, STRONGLY BOUND IN CLOTH.

"*We have looked carefully through the volumes. They are admirably 'got up;' the descriptions are accurate, and remarkably clear and comprehensive. We have seldom examined books better 'edited.'* . . . . *Altogether, this series of works is of immense value to Tourists.*"—ART JOURNAL.

"*They should find a corner in the portmanteau of every person about to undertake a journey of pleasure or business either in England and Wales, or Scotland.*"—JOHN BULL.

ENGLAND, Fourth Edition, Corrected throughout, and greatly Enlarged, containing 198 Routes, and Illustrated by Twenty-seven elaborately constructed Maps and Charts, besides Views of the Scenery; an Alphabetical List of Places, Exhibitions, &c., in London, with the Mode of obtaining Admission; all the Hotels and Inns, Rates of Charges, and a comprehensive General Index. Price 10s. 6d.

SCOTLAND, Thirteenth Edition, Greatly Improved, and Illustrated by One hundred and thirty-six Engravings, consisting of an Accurate Travelling Map, Engraved Maps and Charts of Roads, Railroads, and interesting Localities, Plans of the towns of Edinburgh, Glasgow, Perth, and Aberdeen, Views of the Scenery, after Montague Stanley, Cattermole, Leitch, Thomson, J. M Richardson junior, Sir Thomas Dick Lauder, &c.; and containing full information regarding the best Hotels, Rates of Charges, Coach and Steamer Routes, Distances, and other matters affecting the Convenience of the Tourist. Price 8s. 6d.

IRELAND, Second Edition, embracing Descriptions of all the Routes frequented by Tourists, with full information regarding Hotels, Inns (and the charges made by each), Conveyances, Guides, and every Topographical Information likely to prove useful. Illustrated by a Map of Ireland, Chart of the Lakes of Killarney on a large scale, and Plans of the principal towns. In a neat pocket volume, cloth limp, price 5s.

The work is divided into four sections, each of which may be had separately at 1s. 6d. each, bound in limp cloth.

I.—DUBLIN AND THE WICKLOW MOUNTAINS.
II.—KILLARNEY AND THE SOUTH.
III.—THE SHANNON AND WEST.
IV.—BELFAST, GIANT'S CAUSEWAY, AND THE NORTH.

ENGLISH LAKES, Eighth Edition, Enlarged and Improved, Including an Essay on the Geology of the District, by John Phillips, M.A., F.R.S., F.G.S., Deputy Reader in Geology in the University of Oxford; and Memoranda for Botanists. With a minutely accurate Map, by W. Hughes; Charts of the Lakes, Twelve Outline Views of Mountain Groups, and Views of the Scenery on Wood and Steel. Containing, also, an ample Itinerary of all the Routes, with the Distances accurately laid down, all the best Hotels and Inns, and a Complete Index. Price 5s. (A Cheap Edition of this is published, price 1s. 6d.)

WALES—North and South, and Monmouthshire. Sixth Edition. Containing a Full Description of every Remarkable Place, with Thirty-five Illustrations, including Maps, Charts, and Views of Scenery; with all the Hotels and Inns, and a Copious Itinerary. Price 5s.

WALES—North, with an excellent Travelling Map, and Illustrated by Maps, Charts, and Views of Scenery. Price 3s. 6d.

DERBYSHIRE, including Matlock Bath, Chatsworth, Buxton, Castleton, Dovedale, and every other place of interest. With a Map of the County and Plan of Chatsworth. Price 1s. 6d.

HAMPSHIRE AND DORSETSHIRE, including Descriptions of the Isle of Wight, Winchester, Southampton, Netley Abbey, Portsmouth, the New Forest, Weymouth, Dorchester, Poole, and every other place of interest. With Map. Price 1s. 6d.

DEVONSHIRE AND CORNWALL, EXETER, PLYMOUTH, and DEVONPORT, LAUNCESTON, TRURO, LAND'S-END, and the SCILLY ISLANDS. With Map. Price 1s. 6d.

WARWICKSHIRE, including KENILWORTH, STRATFORD-ON-AVON, BIRMINGHAM, &c., with Map. Price 1s. 6d.

HIGHLANDS AND ISLANDS OF SCOTLAND, including ORKNEY AND ZETLAND. Descriptive of their Scenery, Statistics, Antiquities, and Natural History. Containing, also, Directions for visiting the Lowlands of Scotland, with Maps, Views, Tables of Distances, Notices of Inns, &c. &c. By George and Peter Anderson of Inverness. Third Edition, carefully Revised, Enlarged, and Remodelled. Price 10s. 6d.

THE TROSACHS, LOCH KATRINE, LOCH LOMOND, and Neighbouring Routes, including the Districts of Aberfoyle, Balquhidder, Menteith, and Rob Roy's Country, &c &c.; with Map and Numerous Illustrations. Price 1s. 6d.

HIGHLANDS OF PERTHSHIRE, including Descriptions of Perth and Environs—Dunkeld, Blair-Atholl, Kenmore, Loch Tay, Killin, Lochearnhead, Callander, and the Trosachs; with Map, Charts, and numerous illustrations. Price 1s. 6d.

HIGHLANDS OF ARGYLESHIRE AND BUTE. Containing a Description of Glasgow, Gareloch, Loch Long, Loch Goil, Bute, and Arran, and all the principal places of interest and resort on the West Coast of Scotland, the various Steamer and Coach Routes, &c.; with Map. Price 1s. 6d.

STAFFA, IONA, GLENCOE, AND CALEDONIAN CANAL, including a Description of Oban and its vicinity; with Map of Mull, and a view of Fingal's Cave. Price 1s. 6d.

WORKS PUBLISHED BY A. AND C. BLACK.

ISLAND OF SKYE, and West of Ross-shire; with a Map of Skye. Price 1s. 6d.

ABERDEEN, BALMORAL, AND BRAEMAR, including excursions among the Cairngorm Mountains; with Map and Illustrations. Price 1s. 6d.

EDINBURGH, with a Description of the Environs, including Melrose, Abbotsford, Dryburgh, St. Andrews, Linlithgow, Lochleven, &c. New Edition. Illustrated with a Plan of the City, a Map of the Country Ten Miles round, and numerous Views of the Public Buildings and Scenery. Price 2s. 6d. and 1s. 6d.

GLASGOW and the West Coast. Including the Falls of the Clyde, Bute, Arran, Staffa, Iona, and the Land of Burns; with a Plan of Glasgow and other Charts, numerous Views of the Public Buildings and neighbouring Scenery. Price 2s. 6d. and 1s. 6d.

MOFFAT AND VICINITY, St. Mary's Loch, the Grey Mare's Tail, Loch Skene, &c., and Hints to Anglers in the Rivers, Streams, and Lochs in the Neighbourhood; with Map and Illustrations. Price 1s.

BLACK'S ROAD AND RAILWAY TRAVELLING MAPS.

Carefully constructed from the Maps of the Ordnance Survey and other Authorities, and containing all the Roads, Railroads, Villages, Country Seats, Fishing Streams, Rivers, Lakes, and Mountains, and every Topographical information required by the Tourist on pleasure or business. Lined with, or printed on, patent cloth, and neatly bound in portable cases.

ENGLAND AND WALES. 32 Inches by 22½. 4s. 6d. Do. Smaller. Size 19 Inches by 15, 2s. 6d. Or uncoloured and unmounted, 1s.

ENGLISH LAKE DISTRICT. 19 Inches by 14. 2s. 6d. Do. Do. Do. Uncoloured and unmounted. Price 8d.

WALES (North and South). 14 Inches by 11¼. 1s. 6d. each

SCOTLAND. 32 Inches by 22½. Price 4s. 6d. Do. Smaller. Size 19 Inches by 15, 2s. 6d. Or uncoloured and unmounted, 1s.

IRELAND. Size 20 Inches by 14½. Price 2s. 6d.

ORDNANCE SURVEY MAPS OF SCOTLAND. So far as published, including Counties of Edinburgh, Haddington, Fife, Kirkcudbright, Wigton, &c. Price 2s. 6d. and 5s. per Sheet. Index Maps may be had.

COUNTIES OF SCOTLAND, in separate Maps, coloured, and neatly bound in cloth cases. Price 1s. each.

TOURIST'S AND SPORTSMAN'S COMPANION TO THE COUNTIES OF SCOTLAND. A series of Thirty-six Maps, shewing all the Roads, Railways, Villages, Country Seats, Rivers and Lakes, Places of Historical and Legendary Note; Memoranda of Battles, Heights of Mountains, &c. &c. In a portable volume, strongly bound. Price 10s. 6d.

MEMENTO OF THE TROSACHS, LOCH KATRINE, AND LOCH LOMOND. A Series of Twenty-seven Engravings, by Birket Foster. Square 18mo. Price 1s., and in Cloth, 1s. 6d.

WORKS ON GARDENING AND BOTANY.

I.

THE COTTAGE GARDEN, By Robert Adamson. 12mo, price 2s. Second Edition.

II.

NEILL'S FRUIT, FLOWER, AND KITCHEN GARDEN. Fifth Edition, improved, with Additions, price 5s.

> "In Horticultural Literature, no book has acquired a higher reputation than the late Dr. Neill's concise and popular treatise on Practical Gardening. It is copiously illustrated; and no gardener, be he amateur or professional, great or small, whether he grows pines or only potatoes, should be without it."—*Morning Post.*

III.

THE AMATEUR GARDENER'S YEAR BOOK: A Guide for those who cultivate their own Gardens in the Principles and Practice of Horticulture. By the Rev. Henry Burgess, LL.D. and Ph. D., &c. &c. Fcap. 8vo, price 5s., with illustrated Frontispiece and Title.

> "This is, beyond compare, the best work of its class that has come under our notice. It is really popular."—*Critic.*
>
> "Contains a great deal of valuable information in laying out gardens, and keeping a suitable succession of flowering plants and shrubs."—*Atlas.*

IV.

OUTLINES OF BOTANY: Being an Introduction to the Study of the Structure, Functions, Classification, and Distribution of Plants. With a Glossary and Copious Index. By John Hutton Balfour, M.D., F.R.S.L. & E., F.L.S., Professor of Botany in the University of Edinburgh. Fcap. 8vo, 7s. 6d., illustrated by 595 Wood Engravings.

V.

CLASS-BOOK OF BOTANY: Being an Introduction to the Study of the Vegetable Kingdom. By J. H. Balfour, M.D., F.R.S.L. & E., Regius Keeper of the Royal Botanic Garden, Professor of Medicine and Botany in the University of Edinburgh. In one large volume 8vo, with 1800 Illustrations, price 31s. 6d.

The same may also be had in Two Parts.

Part I.—STRUCTURAL & MORPHOLOGICAL BOTANY, 8vo, 10s. 6d.

Part II.—COMPRISING THE ELEMENTS OF VEGETABLE PHYSIOLOGY, CLASSIFICATION, BOTANICAL GEOGRAPHY, AND FOSSIL BOTANY, WITH A GLOSSARY OF TERMS. 8vo, 21s.

MISCELLANEOUS WORKS.

CAIRD.—THE POOR LAW MANUAL FOR SCOTLAND. By ALEXANDER M'NEEL CAIRD, Esq. Sixth Edition. Crown 8vo, 7s. 6d.

COCKBURN.—MEMORIALS OF HIS TIME. By HENRY COCKBURN, late one of the Senators of the College of Justice. With Portrait after Raeburn. Demy 8vo, 14s.

> "This posthumous volume requires no introduction to the public at our hands. Valuable as a contribution to the history of one part of the kingdom during a portion of the last and of the present century, sketched by a contemporaneous pen of great acuteness felicity and humour, it has also taken its place as one of the pleasantest fireside volumes which has been published of late years."—*Edinburgh Review.*

By the same Author,

LIFE OF LORD JEFFREY, late one of the Senators of the College of Justice. Second Edition. 2 vols. 8vo, 25s.

CREUZE.—A TREATISE ON THE THEORY AND PRACTICE OF NAVAL ARCHITECTURE. By AUGUSTINE F. B. CREUZE. 4to, 12s.

DENISON.—CLOCKS AND LOCKS. From the Eighth Edition of the "Encyclopædia Britannica." Second Edition, with a full account of the Great Clock at Westminster. By EDMUND BECKETT DENISON, M.A., Q.C. Illustrated. 12mo, 3s. 6d.

> "We refer such of our readers as take an interest in the science of lock-picking, to Mr. Denison's very amusing volume. There they will find all the recent attempted improvements both in locks, clocks, and watches, fully described, and their merits and defects criticised in a most workmanlike style."—*Scotsman.*

> "*Useful from the amount of information it communicates on the subject* of clocks and locks, and amusing from the personal details which the author gives us."—*Practical Mechanic's Journal.*

EDINBURGH ESSAYS.—BY MEMBERS OF THE UNIVERSITY.

CONTENTS.

I. PLATO. By JOHN STUART BLACKIE, M.A., Professor of Greek in the University.

II. EARLY ENGLISH LIFE IN THE DRAMA. By JOHN SKELTON, Advocate.

III. HOMŒOPATHY. By WILLIAM T. GAIRDNER, M.D., etc.

IV. INFANTI PERDUTI. By ANDREW WILSON.

V. PROGRESS OF BRITAIN IN THE MECHANICAL ARTS. By JAMES SIME, M.A.

VI. SCOTTISH BALLADS. By ALEXANDER SMITH, Secretary to the University.

VII. SIR WILLIAM HAMILTON. By THOMAS SPENCER BAYNES, LL.B.

VIII. CHEMICAL FINAL CAUSES. By GEORGE WILSON, M.D., F.R.S.E., Regius Professor of Technology in the University. Demy 8vo, 7s. 6d.

FALCONER.—THE SHIPWRECK. By WILLIAM FALCONER, with Life by ROBERT CARRUTHERS, and Numerous Exquisite Illustrations by Birket Foster and Noel Humphreys. In small 4to, elegantly bound in cloth, gilt, price 12s. 6d.; morocco extra, 21s.

"Mr. Foster's pencil revels luxuriantly amid the sylvan scenes of home, and among those that do business in great ships, and go down into deep waters; his designs are exquisitely engraved by the brothers Dalziel, Green, and Evans. Some beautiful vignettes and initial letters designed by Noel Humphreys give additional value to this very pretty volume."—*Art Journal.*

"The illustrations of this well-known volume are entirely from the hand of Birket Foster, and fully sustain his reputation."—*Daily News.*

FORBES.—A REVIEW OF THE PROGRESS OF MATHEMATICAL AND PHYSICAL SCIENCE in more recent times, and particularly between the years 1775 and 1850; being one of the Dissertations prefixed to the Eighth Edition of the "Encyclopædia Britannica." By JAMES D. FORBES, D.C.L., F.R.S., Professor of Natural Philosophy in the University of Edinburgh. 4to, 8s. 6d.

By the same Author,

NORWAY AND ITS GLACIERS. Followed by Journals of Excursions in the High Alps of Dauphiné, Berne, and Savoy. By JAMES D. FORBES, D.C.L., F.R.S., Sec. R.S., Edin.; Corresponding Member of the Institute of France, and Professor of Natural Philosophy in the University of Edinburgh. With Two Maps, Ten Lithographic Views printed in colours by Day and Son, and Twenty-two Wood Engravings. Royal 8vo, 21s.

> "*This is one of those books which we need not blush to present to foreign philosophers and men of learning as a specimen of the literature of science in England.*"—EXAMINER.

By the same Author,

THE TOUR OF MONT BLANC AND OF MONTE ROSA. Being a Personal Narrative, abridged from the Author's "Travels in the Alps of Savoy," &c. Illustrated, 12mo, 5s.

> "*An admirable edition, and the Map of the Mer de Glace most correct and valuable.*"—ALBERT SMITH.

FRASER.—TURKEY ANCIENT AND MODERN. Being an Historical Survey of the Ottoman Empire, from its establishment in Europe to the Present Day. By ROBERT W. FRASER, M.A. Crown 8vo, 7s. 6d.

GRAHAM.—MUSICAL COMPOSITION: Its Theory and Practice. With numerous Engravings and copious Musical Illustrations interspersed with the text. By G. F. GRAHAM, Author of the article Music in the "Encyclopædia Britannica." 4to, 9s.

JOHNSON.—MADEIRA, ITS CLIMATE AND SCENERY: a Hand-Book for Invalid and other Visitors. By ROBERT WHITE. Second Edition. Edited by JAMES YATE JOHNSON, of the Middle Temple. With Map, Crown 8vo, 7s. 6d.

> *The most complete and trustworthy Guide Book to Madeira yet published.*"—LITERARY GAZETTE.

JUKES.—THE STUDENT'S MANUAL OF GEOLOGY. By J. B. JUKES, M.A., F.R.S., Local Director of the Geological Survey of Ireland, and Lecturer on Geology to the Museum of Irish Industry. Crown 8vo, 8s. 6d.

MACAULAY.—A NEW EDITION (the 14th) OF MACAULAY'S MEDICAL DICTIONARY, designed for Popular Use; containing an Account of Diseases and their Treatment, including those most frequent in Warm Climates. Greatly enlarged and improved, and in most part re-written, by ROBERT WELBANK MACAULAY, M.D., H.E.I.C.S. Demy 8vo, 10s. 6d.

M'CULLOCH.—A TREATISE ON METALLIC AND PAPER MONEY AND BANKS, written for the Encyclopædia Britannica. By J. R. M'CULLOCH, Esq., 4to, 5s.

> "By modern students it will be found most concise and valuable, since it brings the entire subject to its latest stage, and is characterised by all the vigour and clearness of expression peculiar to the author of the Commercial Dictionary."—*The Times.*

By the same Author.

TREATISES ON SUBJECTS CONNECTED WITH ECONOMICAL POLICY; with Biographical Sketches of Quesnay, Smith, and Ricards. 8vo., 14s.

NICOL.—ELEMENTS OF MINERALOGY; containing a General Introduction to the Science, with descriptions of the Species. By JAMES NICOL, F.G.S., Professor of Natural History in Marischal College and University of Aberdeen. 12mo, 5s.

POOLE.—THE GENESIS OF THE EARTH AND OF MAN: A Critical Examination of Passages in the Hebrew and Greek Scriptures; chiefly with a View to the Solution of the Question—Whether the Varieties of the Human Species be of more than One Origin. Edited by REGINALD STUART POOLE, M.R.S.L., &c. Crown 8vo, 5s.

RAMSAY.—THE GENTLE SHEPHERD. By ALLAN RAMSAY. New Edition, with numerous Illustrations after David Allan. 18mo, 2s. 6d.

RUSSELL.—THE STEAM-ENGINE. By JOHN SCOTT RUSSELL, M.A., F.R.S.E. Illustrated. Post 8vo, 5s.

By the same Author,

STEAM AND STEAM NAVIGATION. A Treatise on Nature, Properties, and Applications of Steam and on Steam Navigation. Illustrated. Post 8vo, 9s.

RUSSELL.—NORTH AMERICA; its Agriculture and Climate: containing observations on the Agriculture and Climate of Canada, the United States, and the Island of Cuba. By ROBERT RUSSELL, Kilwhiss. With Coloured Map and Plans. Demy 8vo, 14s.

"A book of great practical value as well as much grasp of thought."—*National Review.*

"Mr. Russell's work on North America belongs to a much higher class of literature than the common run of books on that subject. His style is plain, forcible, straightforward, and entirely free from affectation and excitement. The chief interest of this book, to general readers, lies in the sober and dispassionate estimate which his travels in the Slave States and Cuba enabled him to form of the economical results of the employment of slave-labour; and his views have certainly the merit of being not only very clear, but logical and connected."—*Saturday Review.*

"Mr. Stirling, in a very able and valuable series of letters from the Slave States, has lately attempted to show that almost all economical conditions *alike* favour the introduction of free-labour, but we fear he has in this respect a little overshot the mark. Mr. Russell, in his masterly work on the Agriculture and Climate of the United States, has made, we believe, a much nearer approximation to the true law, and furnished the materials for its complete exhibition. In all questions alike, to face the facts just as they are, without the wish to evade any of them, is the wisest course even for those who wish to see a different class of facts."—*Economist.*

"I have read this work both with pleasure and advantage, and every one connected with agriculture must thank you for the treasures of facts you have laid open and illustrated."—*Baron Liebig.*

SCRYMGEOUR.—THE POETRY AND POETS OF BRITAIN. From Chaucer to Tennyson, with Biographical Sketches, and a rapid View of the Characteristic Attributes of each. Preceded by an Introductory Essay on the Origin and Progress of English Poetical Literature. By DANIEL SCRYMGEOUR. Post 8vo, 6s. cloth; 6s. 6d. cloth, gilt edges.

SMITH.—THE WEALTH OF NATIONS. An Inquiry into the Nature and Causes of the Wealth of Nations. By ADAM SMITH, LL.D. Edited, and with Life of the Author, by J. R. M'CULLOCH, Esq. Fourth Edition, corrected throughout, and greatly enlarged. 8vo, 16s.

SPALDING.—AN INTRODUCTION TO LOGICAL SCIENCE. By WILLIAM SPALDING, A.M., Professor of Logic in the University of St. Andrews. 12mo, 4s. 6d.

"Professor Spalding publishes in a separate form his elaborate and first-rate article on Logic from the Encyclopædia Britannica. We highly recommend this treatise to the more advanced student."—*Westminster Review.*

STEWART.—THE PRACTICAL ANGLER; or, the Art of Trout Fishing, more particularly applied to Clear Water. By W. C. STEWART. Third Edition. 12mo, 3s. 6d.

"Without hesitation we pronounce this little treatise the best we have ever read on angling for trout with the artificial fly, worm, minnow, and other bait."—*Bell's Life in London.*

YOUNG.—THE ANGLER and TOURIST'S GUIDE to the Rivers, Lakes, and Remarkable Places in the Northern Counties of Scotland. To which is added instructions to young Anglers. By ANDREW YOUNG, Invershin, Sutherlandshire. 18mo, 2s.

MAPS.

MAP OF EUROPE.

Size 3 by 4 feet 4 inches. Scale, 80 miles to the inch.

Engraved from the most recent authorities, and coloured with the greatest precision and accuracy. Accompanied by a Map of the Telegraphic Lines and Fortresses of Europe, and Descriptive Letterpress, exhibiting the Population, Revenues and Debts, Naval and Military Resources, Territorial Extents, Religions of the different Countries, &c. &c. Price 16s. in sheets, or 18s. Mounted on Linen, in a handsome Portable Case, and 25s. on roller varnished.

"*Admirably executed, and along with it a valuable compendium of the Geography of Europe in letterpress.*"—JOHN BULL.

MAP OF AUSTRALIA, TASMANIA, AND NEW ZEALAND.

Size 48½ by 39 inches.

Taken from the British and French Government Surveys, and other sources of recent and authentic information. Containing also, on an enlarged scale, the Colony of Victoria; Mount Alexander Gold Region, and Plan of Sydney; Port Philip, with Melbourne; Map of Norfolk Island, and a Sketch Map, showing the Principal Commercial Routes to Australia, &c. &c. Price 21s. in sheets. Bound in cloth, 8vo or 4to, or on rollers varnished, 31s. 6d.